75736100
ISSUE 2

CONTROL DATA
CORPORATION

CONTROL DATA®
FLEXIBLE DISK DRIVE

GENERAL DESCRIPTION
OPERATION
INSTALLATION AND CHECKOUT
THEORY OF OPERATION
DIAGRAMS
MAINTENANCE
MAINTENANCE AIDS
PARTS DATA
WIRE LISTS

MAGNETIC PERIPHERALS INC.
a subsidiary of
CONTROL DATA CORPORATION

HARDWARE MAINTENANCE MANUAL

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REVISION RECORD

REV	DATE	TABLE OF CONTENTS SHEETS AFFECTED	MANUAL/SECTION REVISION STATUS												CHANGE AUTHORITY
			I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
A	ISSUE		A	A	A	A	A	A	A	A	A				E.O.B.
B	[illegible]	6-28	A	A	A	A	A	B	A	C	A				PL 12603
C	[illegible]		C	C	C	C	C	C	C	E	C				PL 12748
C1	[illegible]		C	C	C	C	C	C	C	F	C				PL 12781
D	[illegible]	6-26	C	C	C	C	C	D	C	F	C				PL 12792
D1	[illegible]		C	C	C	C	C	D	C	G	C				PL 12857
E	77 APR 22		C	C	C	C	C	D	C	H	C				PL 12872

NOTES

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PREFACE

This Manual provides the information needed to install, operate and maintain the Magnetic Peripheral Inc. Flexible Disk Drive and is intended to service customer engineers and operators who require detailed information about the Flexible Disk Drive's operation.

The total content of the manual is comprised of two publications, each having a unique publication number, and is contained in one volume. The Manual's publication number (75736100) is that of the front matter, sections one through seven, and section nine. This number should be used when making reference to the Flexible Disk Drive Hardware Reference Maintenance Manual. Section eight, Parts Data, is identified by the unique publication number 75736199.

This product is intended for use only as described in this document. Magnetic Peripherals Inc. cannot be responsible for the proper functioning of undescribed features or undefined parameters.

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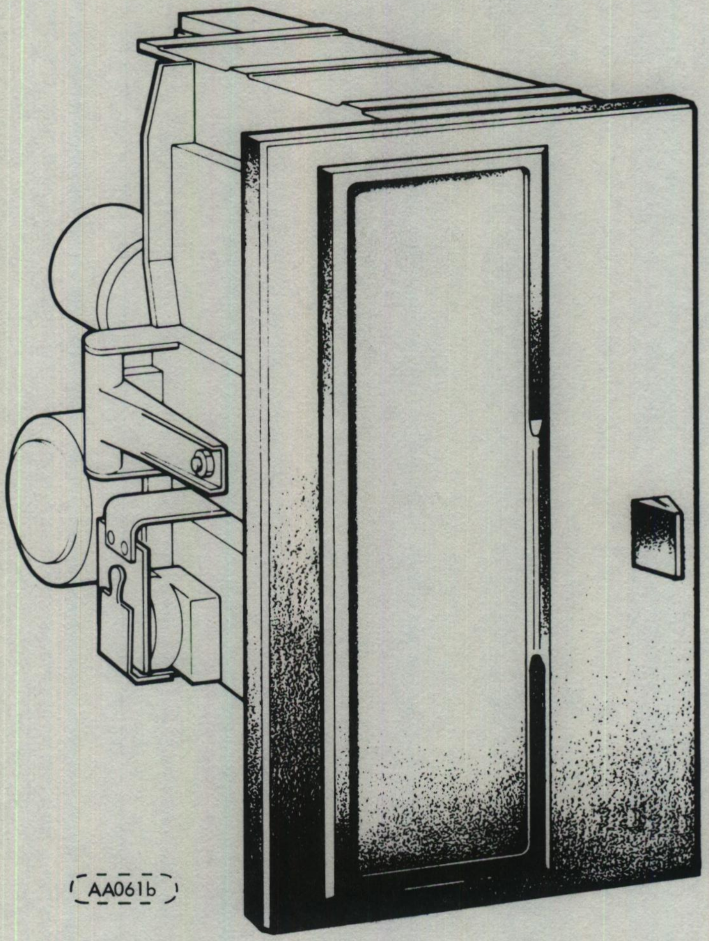


Figure 1—1. Flexible Disk Drive Unit (FDD)

I
GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual applies to the following Flexible Disk Drives: BR803N, BR803P, BR803R, BR803S, BR803T, BR805A, BR805B, BR805C, BR805D, and BR805E.

The Flexible Disk Drive (FDD) is a compact, portable, random access, data storage device (Figure 1-1) that interfaces with a central processor via a control unit. Input/Output data and control signals are transmitted by means of an I/O Cable.

1.2 PURPOSE AND USE OF EQUIPMENT

Data, in the form of magnetized bits, is written on, or read from the tracks of a spinning diskette. The FDD uses a single, flexible, removable diskette (one recording surface) enclosed in a sealed jacket. The unit is capable of hard sector or soft sector (missing clock) format operation, but the missing clock must be recovered externally (from the FDD).

1.3 PRODUCT DESCRIPTION

The major FDD components are the spindle, disk drive motor, read/write head, stepping motor, track indexing device and printed circuit board.

The standard features include ceramic Read/Write head, continually monitored Unit Ready Interrupt, Write Fault circuitry, and Write Current Selection to maintain high read data reliability for data interchange.

Options include a low heat dissipation AC spindle motor, and Write Protect which uses a photo-optical sensor (option).

All FDD components are mounted on a base assembly. The front panel has a spring loaded door through which the diskette is installed. The door is mechanically linked to the disk loading mechanism and the head load interlock switch; therefore, when the door is closed the Read/Write head is loaded on the diskette in preparation for the transfer of data.

1.3.1 PHYSICAL DESCRIPTION

The physical dimensions for the equipment are as follows:

Height	5 inches (12.7 cm)
Width	8.78 inches (22.3 cm)
Depth	14.24 inches (36.1 cm)
Weight	12 lbs. (5.44 kgm)

See Figure 3-1 for detailed envelope dimensions and mounting provisions.

1.3.2 ELECTRICAL DESCRIPTION

The electrical specifications for the equipment are as follows:

- D.C. Power Source (Supplied by User)

  +24 volts (±10%) @ 2.0A
  + 5 volts (± 5%) @ 1.5A
  - 5 volts (± 5%) @ 0.15A

A.C. Power Source	Applicable Equipment Numbers
120 vac (±10%) single phase, 60 Hz ±2%	BR803N, BR805A
220 vac (±10%) single phase, 50 Hz ±2%	BR803P, BR805B

A.C. Power Source (continued)	Applicable Equipment Numbers (continued)
100 vac (±10%) single phase, 60 Hz ±2%	BR805C, BR803S
100 vac (±10%) single phase, 50 Hz ±2%	BR805D, BR803R
240 vac (±10%) single phase, 50 Hz ±2%	BR803T, BR805E

- Operating Current (per Table 1-1)

Table 1–1. Operating Current

OPERATING CURRENT

MOTOR START CURRENT	ACTUAL MAX. RUN CURRENT	LABEL RATING	APPLICABLE EQUIPMENT NUMBER
1.50A	0.85A	1.0	BR805A, BR803N
0.80A	0.50A	0.5	BR805B, BR803P
2.0A	1.05A	1.0	BR805D, BR803S
0.75A	0.50A	0.5	BR805E, BR803T
1.8A	0.95A	1.0	BR805C, BR803R

AA058a

1.3.3 PERFORMANCE CHARACTERISTICS

The equipment specifications for the FDD are as follows:

- ACCESSING TIME

Maximum Access Time	770 ms
Maximum One-Track Access Time	20 ms
Average Access Time	263 ms

- **RECORDING**

Mode	Double Frequency
Density (nominal)	1836 bpi (outer track) 3268 bpi (inner track)
Data Transfer Rate	249,984 bits/sec
Bits/Byte	8
Bits/Track	41,664
Tracks	77
Sectors	Format Determined

- **DATA CAPACITY**

Bytes/Track	5,208
Bits/Track	41,664
Bits/Diskette	3,208,128

- **FLEXIBLE DISKETTE** (Optional) — CDC 421-60W, Single Density, or Equiv. / CDC 423-60W, Double Density, or Equiv.

Diskette Dimensions	8 x 8 inches (20.3 x 20.3 cm) (including jacket)
Useable Diskette Recording Surfaces	1
Diskette Surface Diameter	7.88 inches (20.01 cm)
Recording Diameters	Track 76 (inner) 2.0290 inches (5.15 cm) nominal Track 00 (outer) 3.6123 inches (9.18 cm) nominal
Diskette Surface Coating	Magnetic Oxide
Diskette Velocity	360 ±3.5% rpm

- **READ/WRITE HEAD**

Head Unit	1
Track Width	0.013 ±0.0003 inch (0.33 ±0.076 mm)
Track Spacing	0.02083 ±0.0006 inch (0.529 ±0.0152 mm)
Erase to Read/Write Gap	0.035 ±0.002 inch (0.889 ±0.0508 mm)

II
OPERATION

2.1 INTRODUCTION

The FDD is under direct control of the Input/Output and power sources. No special start-up procedure is required. Operation is fully automatic and required no operator intervention during normal operation.

2.2 OPERATING INSTRUCTIONS

Verify that power and I/O cables are securely attached before operation.

2.2.1 FLEXIBLE DISKETTE LOADING

a. Apply AC/DC power to unit.
b. Open FDD door.
c. Remove diskette from storage envelope.
d. If diskette is to be write protected (on units with Write Protect circuitry) be sure Write Protect slot in jacket is open, as shown in Figure 2-1.
e. If a diskette with a Write Protect slot is not utilizing the Write Protect, that is, it will be written on, the slot must be covered with a piece of tape which is opaque to infra-red.
f. Carefully slide diskette into FDD, as shown in Fig. 2-1, until jacket is solidly against stops.
g. Carefully close unit door. Ensure that jacket is properly seated, spindle has engaged diskette, and door is closed and latched.
h. Protect the empty envelope from liquids, dust, and metallic materials.

2.2.2 FLEXIBLE DISKETTE REMOVAL

a. Open FDD door to stop diskette rotation and disengage spindle.
b. Remove diskette from FDD and put it in its storage envelope.
c. Close FDD door.

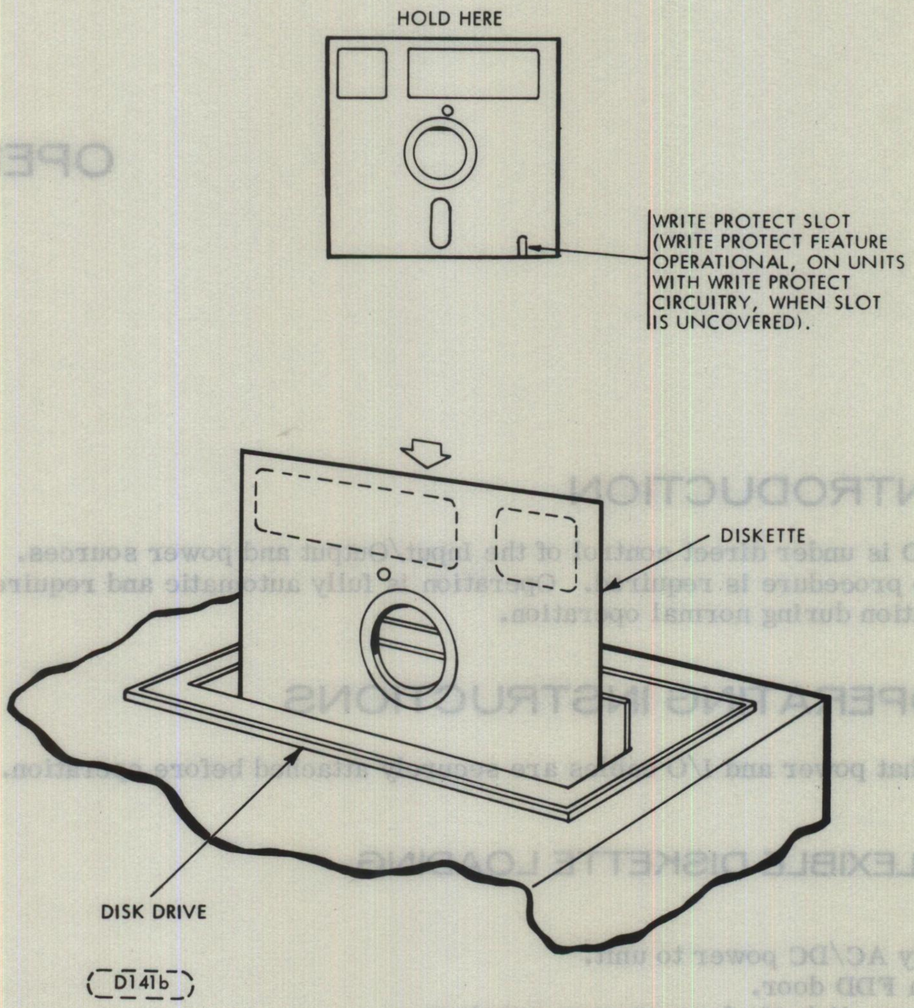

HOLD HERE
WRITE PROTECT SLOT (WRITE PROTECT FEATURE OPERATIONAL, ON UNITS WITH WRITE PROTECT CIRCUITRY, WHEN SLOT IS UNCOVERED).
DISKETTE
DISK DRIVE
D141b

Figure 2—1. Diskette Installation

2.3 ERROR RECOVERY

The following paragraphs give information needed to recover from possible errors in equipment operation.

2.3.1 SEEK ERROR

Seek errors will rarely occur unless the stepping rate is significantly exceeded. In the event of a seek error, recalibration of track location can be achieved by repetitive Step Out commands until a Track 00 signal is received.

2.3.2 WRITE ERROR

To guard against degradation from imperfections in the media, no more than 4 attempts to write a record should be used when Read After Write errors are encountered. In the event a record cannot be successfully written within 4 attempts, it is recommended that the sector or track be labled defective and an alternate sector or track assigned. If more than 2 defective tracks are encountered, it is recommended that the diskette be replaced.

2.3.3 READ ERROR

In the event of a Read error, up to 10 attempts should be made to recover with re-reads. If after 10 attempts the data has not been recovered, step the head several tracks away and then re-position to recover the data. Unloading the head when data transfers are not imminent will increase the data reliability and extend the diskette life.

2.4 DISKETTE HANDLING RECOMMENDATIONS

Since the recorded diskette contains vital information, reasonable care should be exercised in its handling. Longer diskette life and trouble free operation will result if the following recommendations are followed.

a. Do not use a writing device which deposits flakes e.g., lead or grease pencils, when writing on diskette jacket label.
b. Do not fasten paper clips to diskette jacket edges.
c. Do not touch diskette surface exposed by jacket slot.
d. Do not clean diskette in any manner.
e. Keep diskette away from magnetic field and from ferromagnetic materials that may be magnetized.

f. Return diskette to envelope when removed from FDD.
g. Protect diskette from liquids, dust, and metallic substances at all times.
h. Do not exceed the following storage environmental conditions:

Temperature: 50° to 125° F (10° to 56.1°C)
Relative Humidity: 8% to 80%
Maximum Wet Bulb: 85°F (29.4°C)

i. Diskettes should be stored in box or cabinet when not in use.

III
INSTALLATION AND CHECKOUT

3.1 INTRODUCTION

This section provides the information and procedures necessary to put an FDD into operation.

3.2 UNPACKING

Unpack FDD as follows:

a. Open top of corrugated carton.
b. Cut banding and lift top half of styrofoam shell from carton.
c. Lift unit in polyethylene bag from bottom half of styrofoam shell and remove unit from polyethylene bag.

During unpacking, care must be used so that any tools being used do not inflict damage to the unit. As a unit is unpacked, inspect it for possible shipping damage. All claims for this type of damage should be filed promptly with the carrier involved. If a claim is filed for damages, save the original packing materials.

3.3 INSTALLATION

Due to its small size and light weight, the FDD can be installed or mounted in any convenient location or position. To reduce possible operator errors, mounting in a vertical position, as shown in Figure 2-1, is recommended. The FDD must be installed in a location that will prevent the I/O Cable from exceeding 25 feet in length. Refer to Figure 3-1 for overall dimensions and mounting provisions.

3.4 CABLING AND CONNECTIONS

The following paragraphs cover the I/O cable and the Power Cable. Figure 3-2(A) shows cable connections for model numbers BR805. Figure 3-2(B) shows cable connections for model numbers BR803.

3.4.1 INPUT/OUTPUT CABLE

The I/O Cable (see Figure 3-3(A) is a required optional item supplied on order. Refer to Figure 3-3(A) for cable connector part number and attachment. The maximum cable length from connector to connector is 25 feet. All inputs and outputs require twisted pairs, one line for function, one for ground. All signal wires must be stranded wire, 26 AWG minimum with a least one twist per inch. Characteristic impedance should be approximately 100 ohms. The DC power wires must be 20 AWG minimum (two lines for power, two lines for ground) with one twist per inch. The I/O Cable Connector is a required optional item also. The connector consists of a self keyed connector with attaching jackscrews. Table 3-1 provides information relative to the connector pin/signal assignments for I/O Cable.

3.4.2 POWER CABLE

The AC Power Cable is an optional item supplied on order. All wires are stranded wire, 18 AWG minimum with center pin connection ground.

Table 3—1. Input/Output Connector Pin Assignments

PIN NUMBER*	FUNCTION	PIN NUMBER*	FUNCTION
1	-Read Data	14	**
2	-Read Clock	15	Not Used
3	-Write Protect	16	Not Used
4	-Write Fault	17	Not Used
5	-Index	18	+5 Volts
6	-Write Fault Reset	19	+5 Volts
7	-Low Current	20	Not Used
8	-Head Load	21	-5 Volts
9	-Write Data	22	-5 Volts
10	-Write Enable	23	Not Used
11	-Step In	24	+24 Volts
12	-Step Out	25	+24 Volts
13	-Track 00		

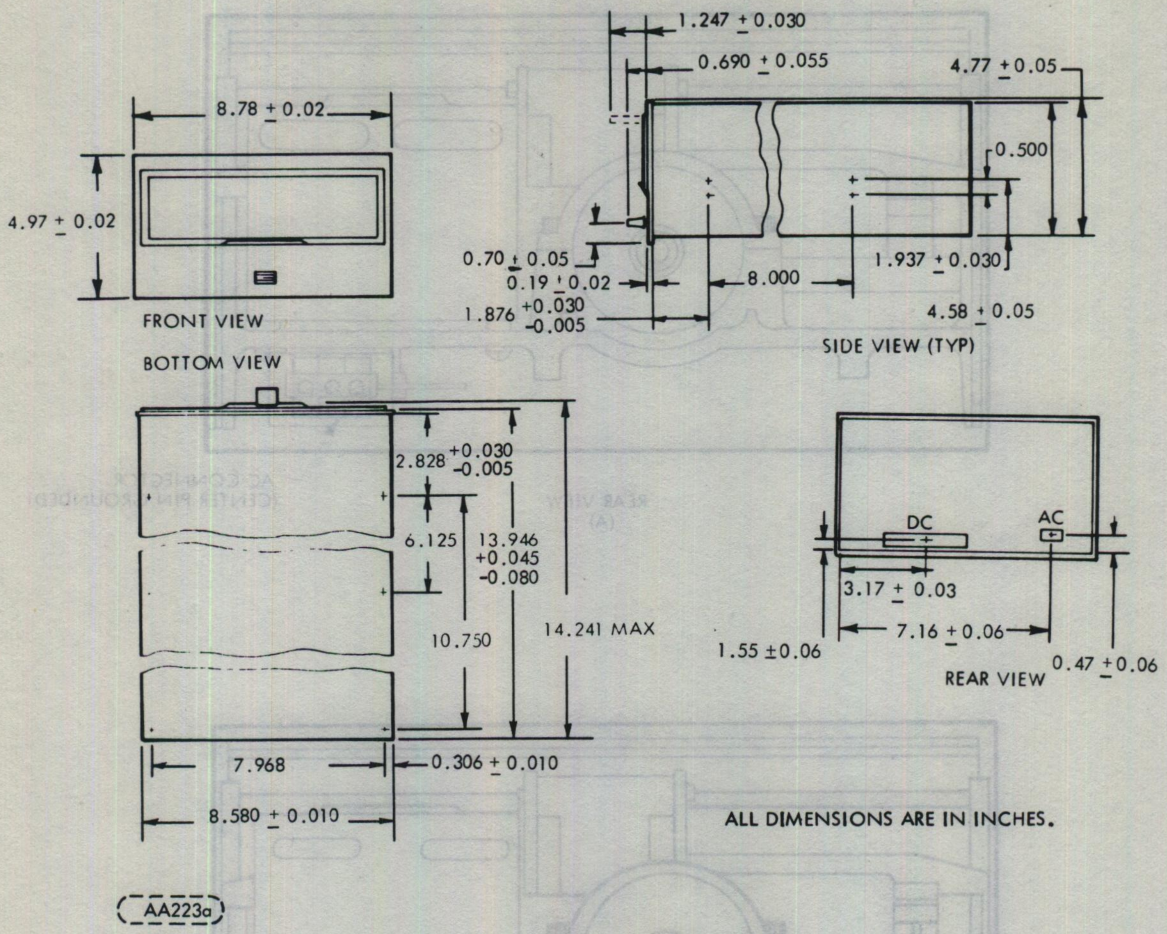
PIN NUMBERS 26 THRU 48 ARE THE LOGIC GROUND RETURN

PIN NUMBERS 49 AND 50 ARE THE +24 VOLT GROUND RETURN (SEPARATED FROM THE LOGIC GROUND)

*REFER TO FIGURE 3-2B FOR PIN NUMBERING SEQUENCE.

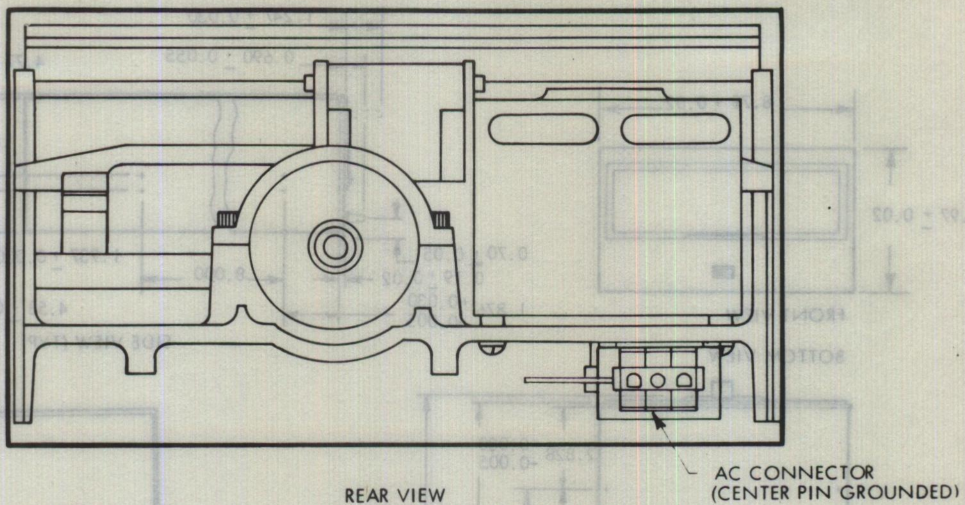
**COMPOSITE DATA (READ DATA AND CLOCK): USED FOR TEST PURPOSES ONLY

AA058b

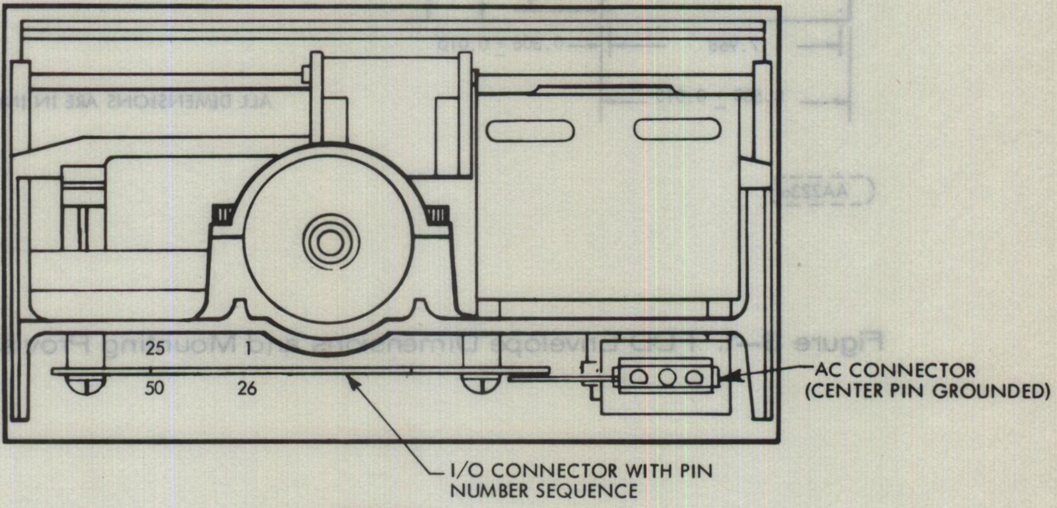


ALL DIMENSIONS ARE IN INCHES.

Figure 3–1. FDD Envelope Dimensions and Mounting Provisions



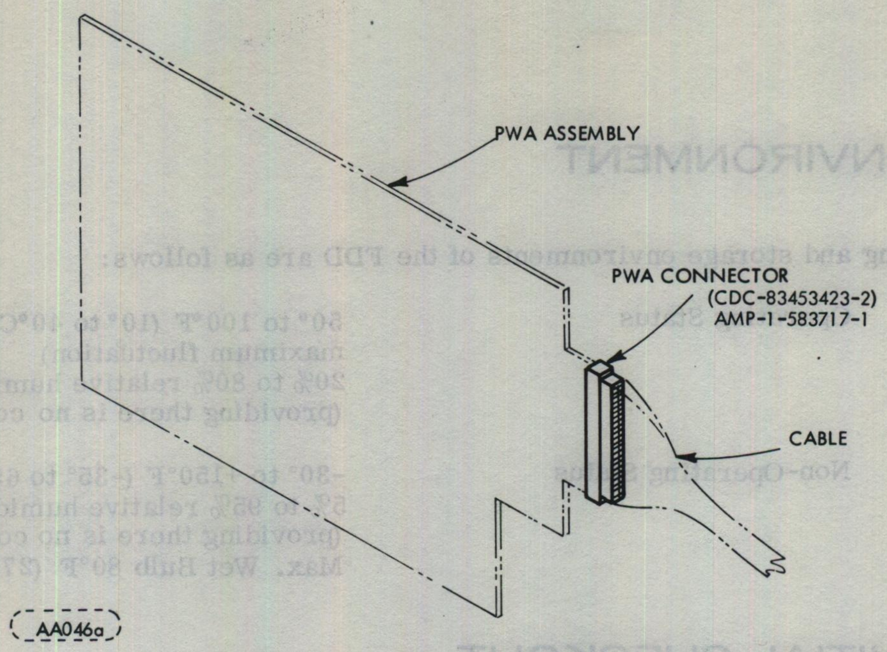
REAR VIEW
(A)



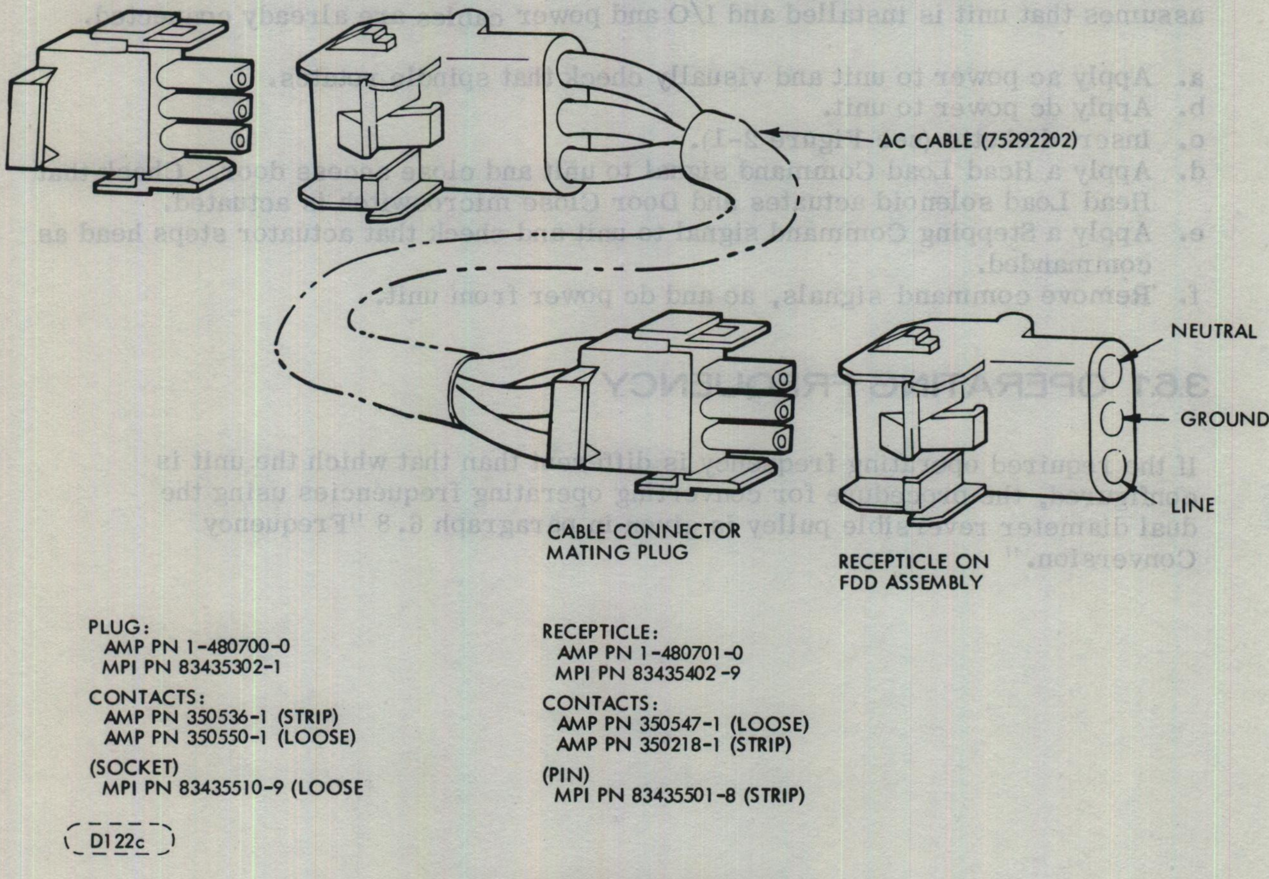
REAR VIEW
(B)

D148a

Figure 3—2. Cable Connection Locations



I/O Cable Assembly
(A)



AC Cable Assembly
(B)

Figure 3—3. Cable Connection

3.5 ENVIRONMENT

Operating and storage environments of the FDD are as follows:

Operating Status	50° to 100°F (10° to 40°C) (12°F/hr maximum fluctuation) 20% to 80% relative humidity (providing there is no condensation).
Non-Operating Status	-30° to +150°F (-35° to 65°C) 5% to 95% relative humidity (providing there is no condensation) Max. Wet Bulb 80°F (27°C).

3.6 INITIAL CHECKOUT

This procedure should be used to determine that FDD is operational. The procedure assumes that unit is installed and I/O and power cables are already connected.

a. Apply ac power to unit and visually check that spindle rotates.
b. Apply dc power to unit.
c. Insert diskette (see Figure 2-1).
d. Apply a Head Load Command signal to unit and close access door. Check that Head Load solenoid actuates and Door Close microswitch is actuated.
e. Apply a Stepping Command signal to unit and check that actuator steps head as commanded.
f. Remove command signals, ac and dc power from unit.

3.6.1 OPERATING FREQUENCY

If the required operating frequency is different than that which the unit is configured, the procedure for converting operating frequencies using the dual diameter reversible pulley is given in paragraph 6.8 "Frequency Conversion."

IV
THEORY OF OPERATION

4.1 INTRODUCTION

The theory of operation for the FDD is divided into two parts. The first part gives a general theory of operation. The second part gives a detail functional description of all major components both electronic and mechanical and describes all signals exchanged between the FDD and the controller.

4.2 GENERAL DESCRIPTION

The basic functions of the FDD are to (1) receive and generate control signals (2) position Read/Write head on selected tracks (3) write or read data upon command from controller.

Signals received and transmitted by the FDD are shown in Figure 4-1 and explained in Table 4-1. During write operation, the FDD receives WRITE ENABLE, LOAD HEAD, WRITE DATA and LOW CURRENT (track 43 or greater) signals and if a write fault occurs, transmits WRITE FAULT. During read operation, LOAD HEAD, READ DATA (SEPARATED), CLOCK (SEPARATED) and READ DATA (COMPOSITE) signals are transmitted by the FDD to the controller. Control signals STEP IN and STEP OUT are received during track seek operation. The FDD continuously transmits INDEX to the controller when the diskette is rotating. Track 00 is transmitted to the controller whenever the Read/Write head is at Track 00.

For units with Write Protect circuitry, a Write Protect signal is transmitted to the controller whenever the Write Protect hole in the diskette jacket is uncovered.

Positioning of the Read/Write head is accomplished by a lead screw driven by a stepper motor. The Read/Write head is mounted on a carriage which is attached to the lead screw. Each STEP OUT or STEP IN command from the user system increments the stepper motor which, in turn, rotates the lead screw 15°. Each 15° rotation of the lead screw moves the Read/Write head one track position.

Reading or writing operation begins by placing the Read/Write head in contact with the diskette at the desired track. To write data on the diskette, WRITE DATA is sent by the controller to condition the write logic, then current pulses, corresponding to the input data, are applied to the write head, causing bits on the diskette track to be correspondly magnetized. Erasure of previously recorded data is simultaneously accomplished during writing operation.

To read from the diskette, magnetized bits in the format of the previously recorded data are sensed by the Read/Write head. This signal is amplified, separated into clock and data information both of which are transmitted to the user system.

4.3 FUNCTIONAL DESCRIPTION

Refer to Figures 4-1, 5-1, and the Schematic Diagram (Section 5) for the following discussion.

The FDD is divided into the following major functional areas:

a. Control Logic
b. Write and Fault Logic
c. Read Logic
d. Disk Drive
e. Read/Write Head

4.3.1 CONTROL LOGIC

The functions of the control logic are to generate the signals that (1) step the Read/Write head in or out upon command of the controller, (2) load the head on the diskette for read/write operations, (3) indicate when Read/Write head is at Track 00, (4) indicate Write-Protect status (option).

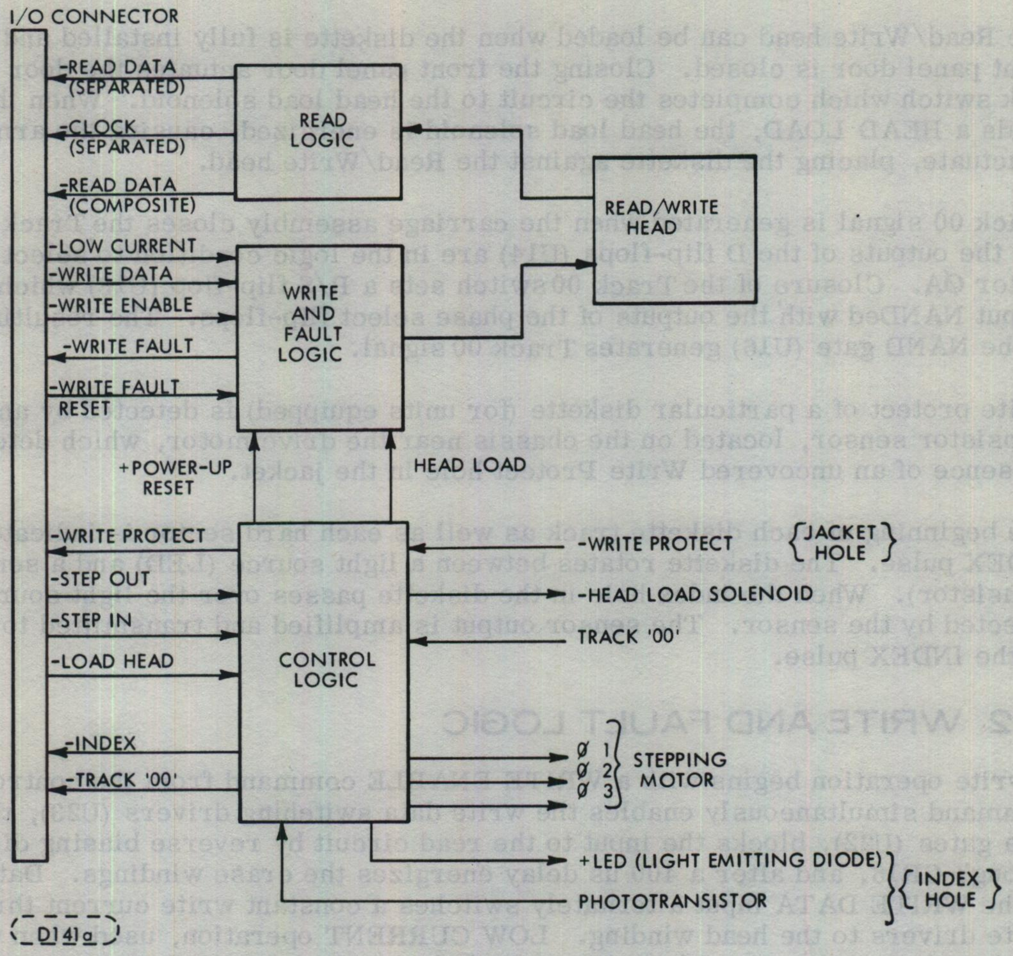


Figure 4-1. Functional Block Diagram

Movement of the Read/Write head is initiated by a STEP IN or STEP OUT command from the user system. Each command received sequentially energizes one of the three phases of the stepper motor. Whether the command is a STEP IN or STEP OUT will determine the sequence that the stepper motor phases are energized, hence the direction that the stepper motor turns. STEP IN command phase sequence is ØA, ØB, ØC, ØA ....STEP OUT command phase sequence is ØA, ØC, ØB, ØA. . . .

At initial voltage application, ØA (AND gate U15, pin 6 enabled) is energized by the output condition of a dual D-type flip-flop (U14). Either a STEP OUT or STEP IN command triggers a 3 us one-shot multivibrator and places the proper inputs on the flip-flops to satisfy the logic conditions for energizing the appropriate motor phase (ØB for STEP IN, ØC for STEP OUT). The flip-flops are clocked by the trailing edge of the 3 us one-shot pulse.

The Read/Write head can be loaded when the diskette is fully installed and the front panel door is closed. Closing the front panel door actuates the door interlock switch which completes the circuit to the head load solenoid. When the controller sends a HEAD LOAD, the head load solenoid is energized, causing the armature bail to actuate, placing the diskette against the Read/Write head.

Track 00 signal is generated when the carriage assembly closes the Track 00 switch and the outputs of the D flip-flops (U14) are in the logic condition to select stepper motor ØA. Closure of the Track 00 switch sets a R/S flip-flop (U13) which has its output NANDed with the outputs of the phase select flip-flops. The resulting output of the NAND gate (U16) generates Track 00 signal.

Write protect of a particular diskette (for units equipped) is detected by an LED/phototransistor sensor, located on the chassis near the drive motor, which detects the presence of an uncovered Write Protect hole in the jacket.

The beginning of each diskette track as well as each hard sector is indicated by an INDEX pulse. The diskette rotates between a light source (LED) and a sensor (phototransistor). When the index hole in the diskette passes over the light source, light is detected by the sensor. The sensor output is amplified and transmitted to the controller as the INDEX pulse.

4.3.2 WRITE AND FAULT LOGIC

A write operation begins with a WRITE ENABLE command from the controller. This command simultaneously enables the write data switching drivers (U23), the write data gates (U22), blocks the input to the read circuit by reverse biasing diodes CR13 through CR16, and after a 400 us delay energizes the erase windings. Data applied to the WRITE DATA input alternately switches a constant write current through the write drivers to the head winding. LOW CURRENT operation, used when writing on track 43 or greater, is selected by switching a series resistor (R71) into the write current source (Q18).

A WRITE FAULT signal is generated if WRITE ENABLE is commanded and the head is not loaded (head load solenoid not energized) or WRITE ENABLE is commanded and no data is applied or WRITE ENABLE is commanded but WRITE DATA is applied at the wrong rate. Either one or both of the conditions sets the WRITE FAULT latch (U26). Commanding a WRITE FAULT RESET clears the WRITE FAULT signal by resetting the WRITE FAULT flip-flop (U26).

The Write Protect (option) is accomplished through use of an LED (light-emitting diode) and a photo transistor. These are mounted such that the presence of a write protect hole in the diskette will cause U8, pins 9 and 10 to be driven low. This signal is then transmitted to the controller through U25, pin 8 and pin 3 of J-1 of the I/O connector.

4.3.3 READ LOGIC

Read operation is enabled when the Read/Write head is loaded on the diskette and WRITE ENABLE is not commanded. With WRITE ENABLE not commanded, the data blocking diodes (CR13 through CR16) are forward biased and data sensed by the Read/Write head is fed to the read data circuit. The read signal from the diskette is in the form of a sine wave (see Figure 5-1).

This analog signal is amplified, filtered, differentiated (reference U1, Q1, Q2 and Q3) and coupled to a combination differential voltage comparator and one-shot multivibrator which develops a 250 nsec pulse for each transistion of the input signal. The read data logic (U3, U4, U6, U7 and U8) separates the composite signal and simultaneously transmits CLOCK, DATA and COMPOSITE outputs to the controller. (This separation is designed for double frequency recording without missing clock only.)

4.3.4 DISK DRIVE

Disk drive is accomplished by clamping the diskette between the cone assembly and a belt driven spindle (Figure 4-2). The spindle is rotated at 360 rpm by the disk drive motor.

4.3.5 READ/WRITE HEAD

The Read/Write head is in direct contact with the diskette during read or write operation. Since the head is rigidly mounted on the carriage assembly, head load is achieved by a solenoid actuated bail (Figure 4-3) allowing the head load arm to force the diskette against the Read/Write Head. The head surface is designed for maximum signal transfer to and from the magnetic surface of the diskette with minimum head/disk wear. The tunnel erase gap DC, erases the intertrack area to reduce off-track signal-to-noise ratio and permit diskette interchange between units.

4.4 CONTROL AND DATA LINE CHARACTERISTICS

Figure 4-4 depicts the control and data line transmission system used on the FDD. All signal lines must be terminated at the receiver with an impedance of 100 ohms. Transmission is by twisted pair 26AWG (min.) (one twist per inch) with a maximum line length of 25 feet. Figure 5-1 shows the timing of typical operations.

4.4.1 LOGIC LEVELS

The following definitions will be used throughout this manual:

Logic 1 (Active State)	Refers to the low-voltage condition of 0 volts (+0.5V, -0.0V).
Logic 0 (Inactive State)	Refers to the high-voltage condition of +5.0 volts (+0.5V, -0.5V).

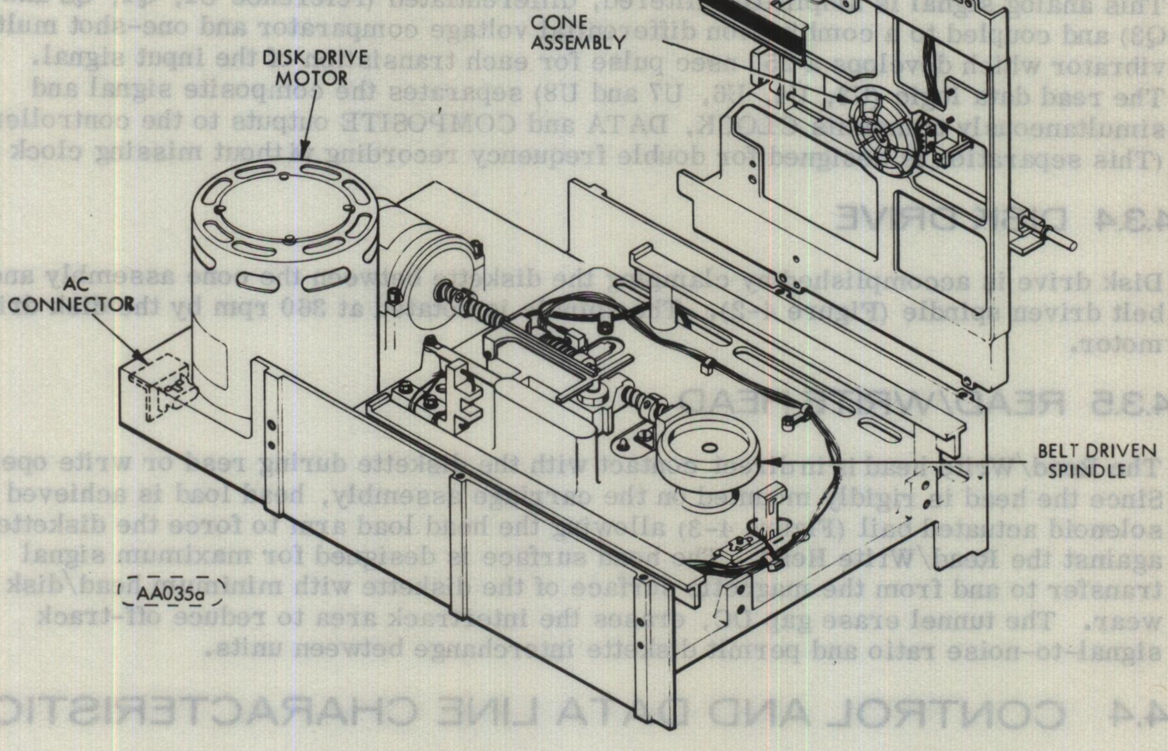


Figure 4—2 Base and Chassis Support Assembly

4.4.2 TRANSMITTER CHARACTERISTICS

The FDD uses the TTL 7440 (dual 4-input buffer or driver) to transmit all control and data signals. This transmitter is capable of sinking a current of 48ma with an output voltage of 0.5 volt.

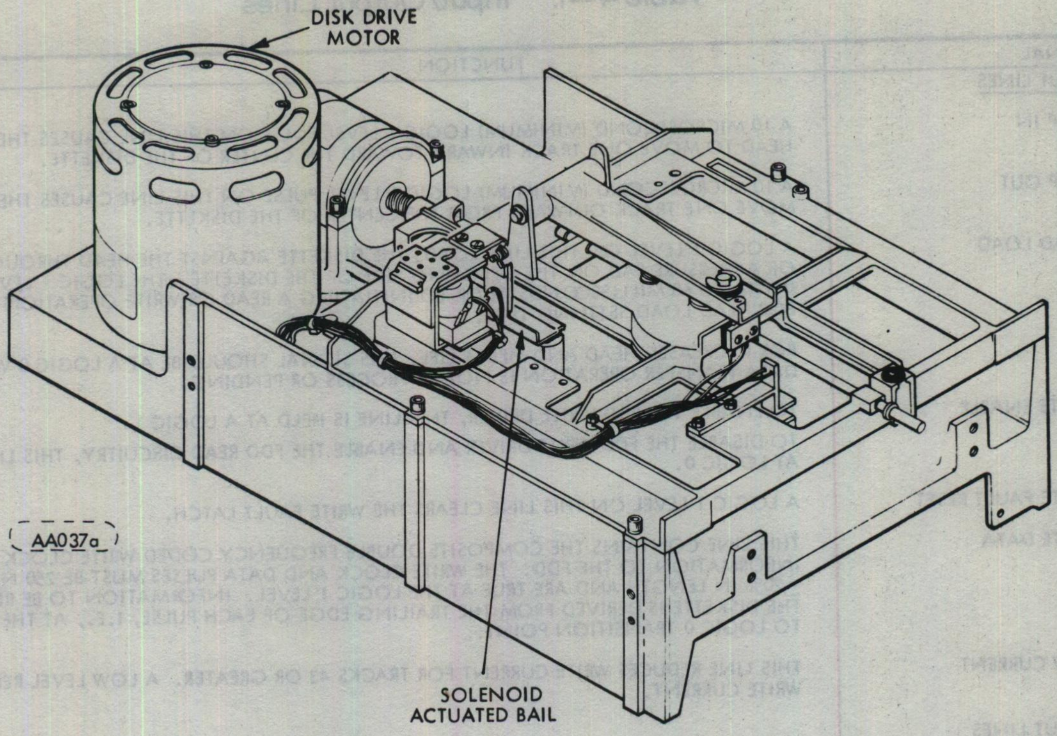


Figure 4—3. Chassis Base Assembly

4.4.3 LINE RECEIVER CHARACTERISTICS

The FDD uses an emitter follower receiver as shown in Figure 4-4 to drive 1/4 of a SN75154 quad line receiver. The input of each receiver is terminated in 100 ohms.

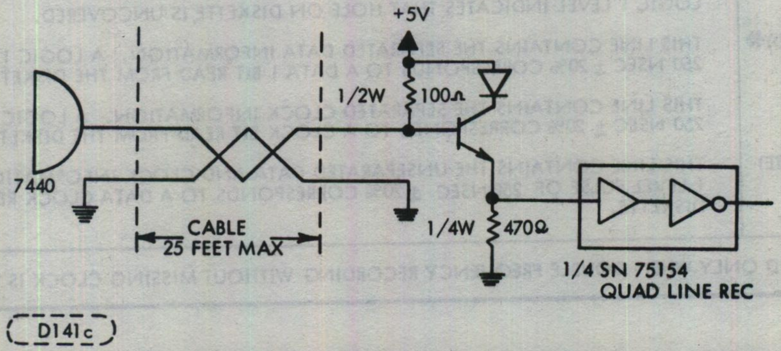


Figure 4—4. Control and Data Line Transmission System

4.4.4 CONTROL AND DATA LINE FUNCTIONS

The signals that are exchanged are described in Table 4-1 and are shown relative to a point of origin in Figure 4-1.

Table 4—1. Input/Output Lines

SIGNAL	FUNCTION
INPUT LINES	
-STEP IN	A 10 MICROSECOND (MINIMUM) LOGIC 1 LEVEL PULSE ON THIS LINE CAUSES THE HEAD TO MOVE ONE TRACK INWARD TOWARD THE CENTER OF THE DISKETTE.
-STEP OUT	A 10 MICROSECOND (MINIMUM) LOGIC 1 LEVEL PULSE ON THIS LINE CAUSES THE HEAD TO MOVE ONE TRACK OUTWARD FROM THE CENTER OF THE DISKETTE.
-HEAD LOAD	A LOGIC 1 LEVEL ON THIS LINE LOADS THE DISKETTE AGAINST THE HEAD THROUGH THE USE OF A PRESSURE PAD ON THE OPPOSING SIDE OF THE DISKETTE. THE LOGIC 1 LEVEL MUST BE INITIATED 60 MILLISECONDS PRIOR TO INITIATING A READ OR WRITE OPERATION TO ALLOW FOR HEAD LOAD SETTLING TIME. FOR INCREASED HEAD AND MEDIA LIFE, THIS SIGNAL SHOULD BE AT A LOGIC 0 WHENEVER A DATA TRANSFER OPERATION IS NOT IN PROCESS OR PENDING.
-WRITE ENABLE	TO ENABLE THE FDD WRITE DRIVER, THIS LINE IS HELD AT A LOGIC 1. TO DISABLE THE FDD WRITE DRIVER AND ENABLE THE FDD READ CIRCUITRY, THIS LINE IS HELD AT LOGIC 0.
-WRITE FAULT RESET	A LOGIC 1 LEVEL ON THIS LINE CLEARS THE WRITE FAULT LATCH.
-WRITE DATA	THIS LINE CONTAINS THE COMPOSITE DOUBLE FREQUENCY CODED WRITE CLOCK AND DATA INFORMATION TO THE FDD. THE WRITE CLOCK AND DATA PULSES MUST BE 250 NANOSECONDS ± 20% IN LENGTH AND ARE TRUE AT THE LOGIC 1 LEVEL. INFORMATION TO BE RECORDED ON THE DISKETTE IS DERIVED FROM THE TRAILING EDGE OF EACH PULSE, I.E., AT THE LOGIC 1 TO LOGIC 0 TRANSITION POINT.
-LOW CURRENT	THIS LINE REDUCES WRITE CURRENT FOR TRACKS 43 OR GREATER. A LOW LEVEL REDUCES WRITE CURRENT.
OUTPUT LINES	
-INDEX	THIS LINE GIVES AN INDICATION OF THE RELATIVE POSITION OF THE DISKETTE BY OUTPUTTING A LOGIC 1 PULSE FOR EVERY SECTOR HOLE OF THE DISKETTE. THE 1.5 ±0.6 MILLISECONDS PULSE IS GENERATED BY SENSING THE INDEX HOLE IN THE DISKETTE USING A PHOTO-OPTICAL TECHNIQUE.
-WRITE FAULT	A LOGIC 1 LEVEL INDICATES ONE OR MORE OF THE FOLLOWING FAULT CONDITIONS. -WRITE ENABLE WITHOUT HEAD LOAD. -WRITE ENABLE WITHOUT WRITE DATA. INCORRECT WRITE DATA RATE. A WRITE FAULT CAN BE CLEARED BY A LOGIC 1 ON THE WRITE FAULT RESET LINE.
-TRACK 00	A LOGIC 1 LEVEL INDICATES THAT THE HEAD IS POSITIONED OVER TRACK 00.
-WRITE PROTECT	LOGIC 1 LEVEL INDICATES THAT HOLE ON DISKETTE IS UNCOVERED.
-READ DATA (SEPARATED)*	THIS LINE CONTAINS THE SEPARATED DATA INFORMATION. A LOGIC 1 LEVEL PULSE OF 250 NSEC ± 20% CORRESPONDS TO A DATA 1 BIT READ FROM THE DISKETTE.
-CLOCK (SEPARATED)*	THIS LINE CONTAINS THE SEPARATED CLOCK INFORMATION. A LOGIC 1 LEVEL PULSE OF 250 NSEC ± 20% CORRESPONDS TO A CLOCK BIT READ FROM THE DISKETTE.
-READ DATA (COMPOSITE)	THIS LINE CONTAINS THE UNSEPARATED DATA AND CLOCK INFORMATION. A LOGIC 1 LEVEL PULSE OF 250 NSEC ± 20% CORRESPONDS TO A DATA CLOCK READ FROM THE DISKETTE.

*THE SIGNALS ARE VALID ONLY WHEN DOUBLE FREQUENCY RECORDING WITHOUT MISSING CLOCK IS USED.

AA043a

4.5 POSTIONING CHARACTERISTICS

The time for a single track move is 20ms including settling time. This is defined as the time to move between any pair of adjacent tracks. Multiple track moves can be made at 10ms per step plus 10ms settling time.

The random average positioning time is 263ms. This is defined as the summation of the move times for all possible moves divided by the number of possible moves.

The maximum positioning time is 770ms. This is defined as the time to move the head from track 00 to track 75 or from 75 to 00 and includes settling time.

V
DIAGRAMS

5.1 INTRODUCTION

This section contains diagrams that describe the Flexible Disk Drive in terms of the functions it performs. Figure 5-1 shows timing diagrams which illustrate signal time relationships during read, write, step-in and step-out operations.

Figure 5-2 is the Printed Circuit Board Schematics and Figure 5-3 contains the Assembly Drawing and Parts List.

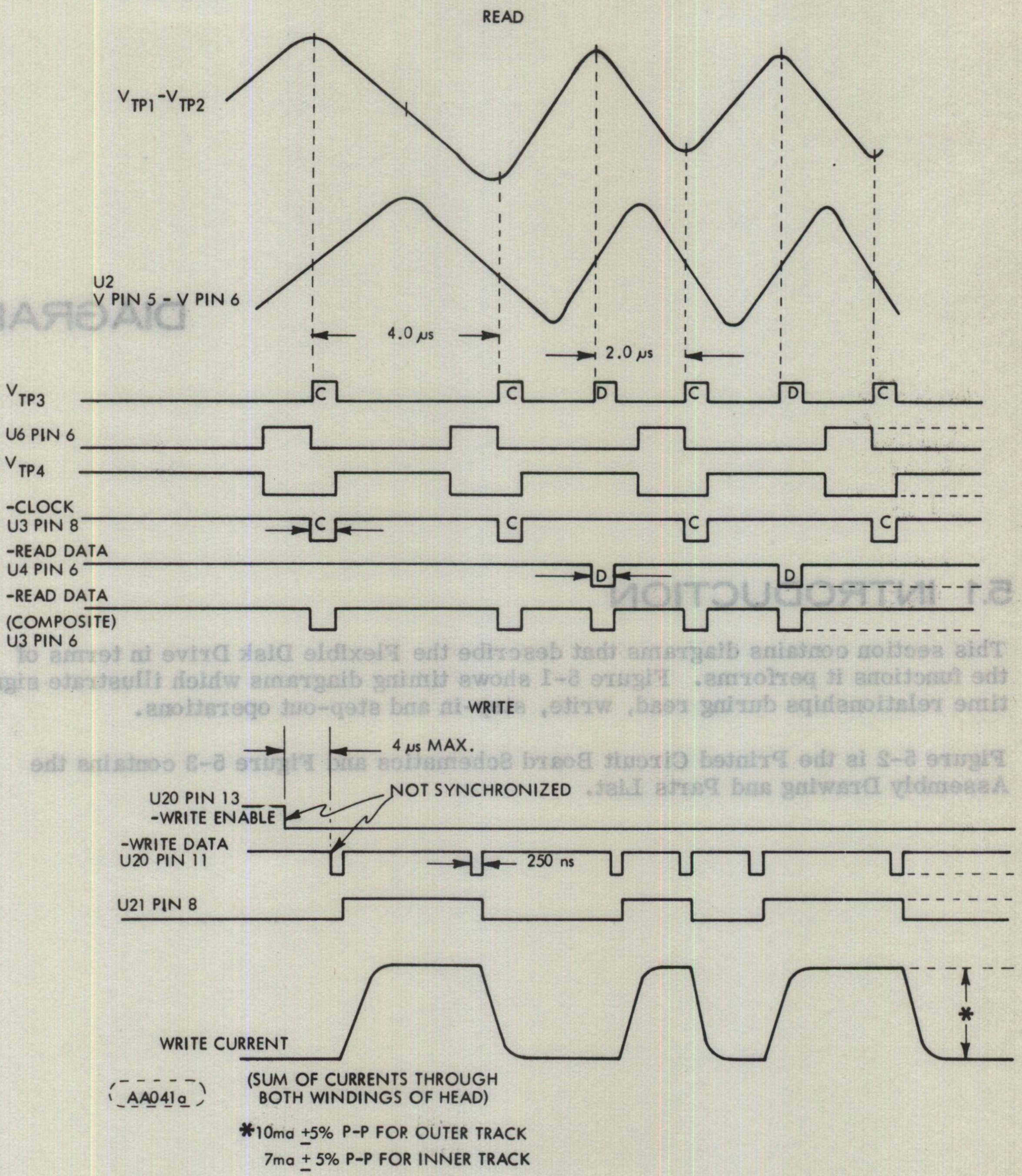


Figure 5—1. Timing Diagrams (Sheet 1 of 2)

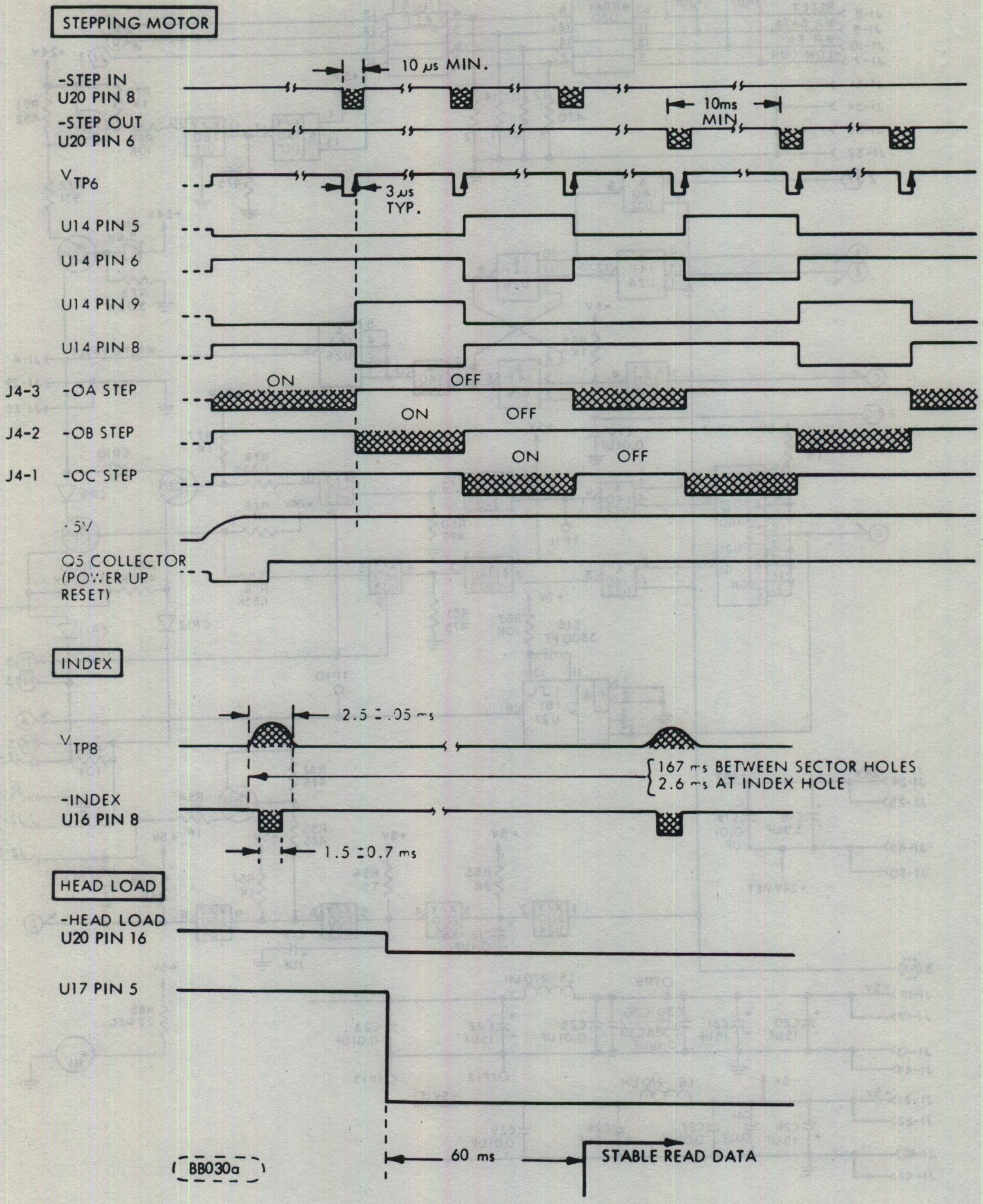


Figure 5–1. Timing Diagrams (Sheet 2 of 2)

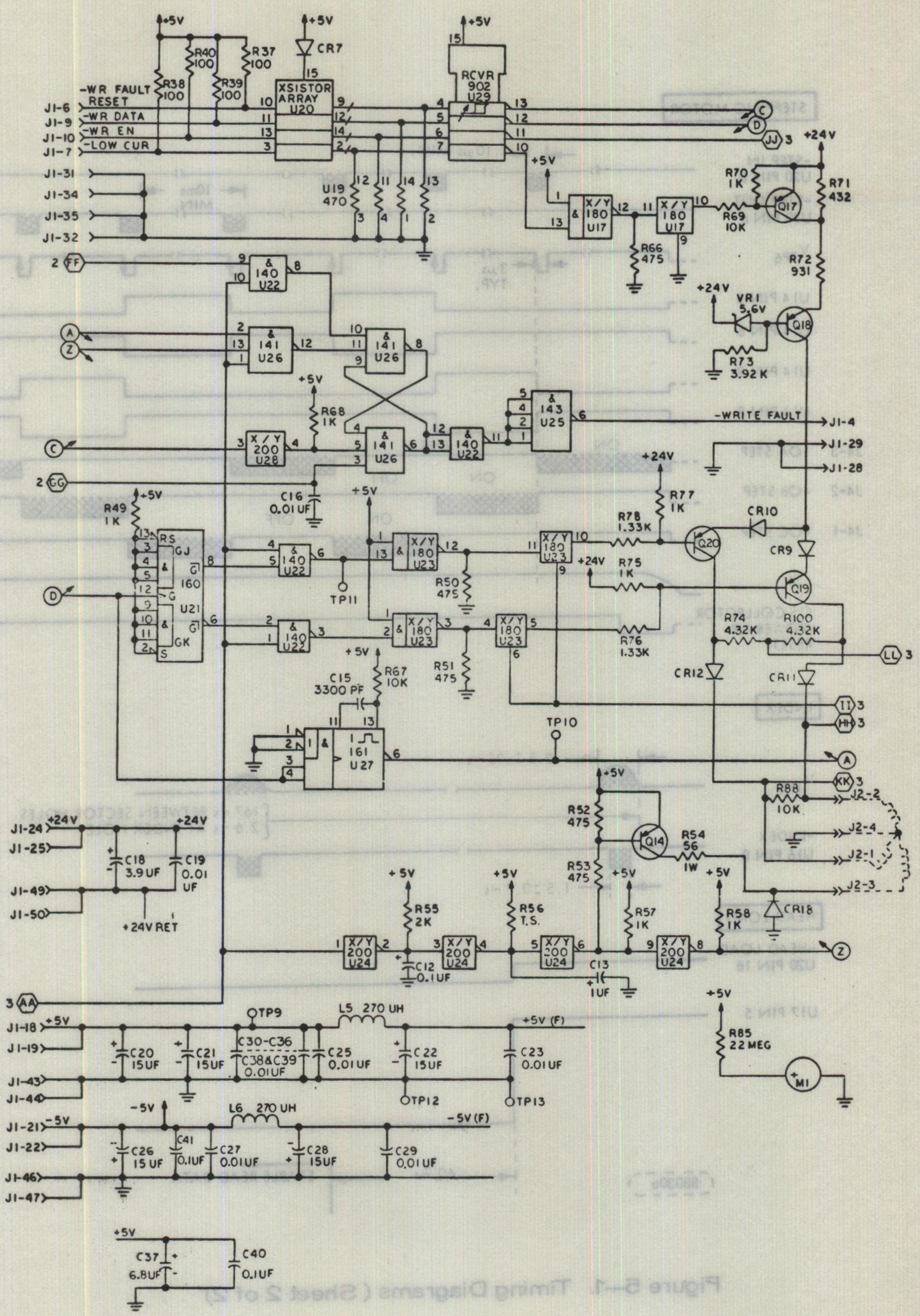


Figure 5–2. Schematics (Sheet 1 of 3)

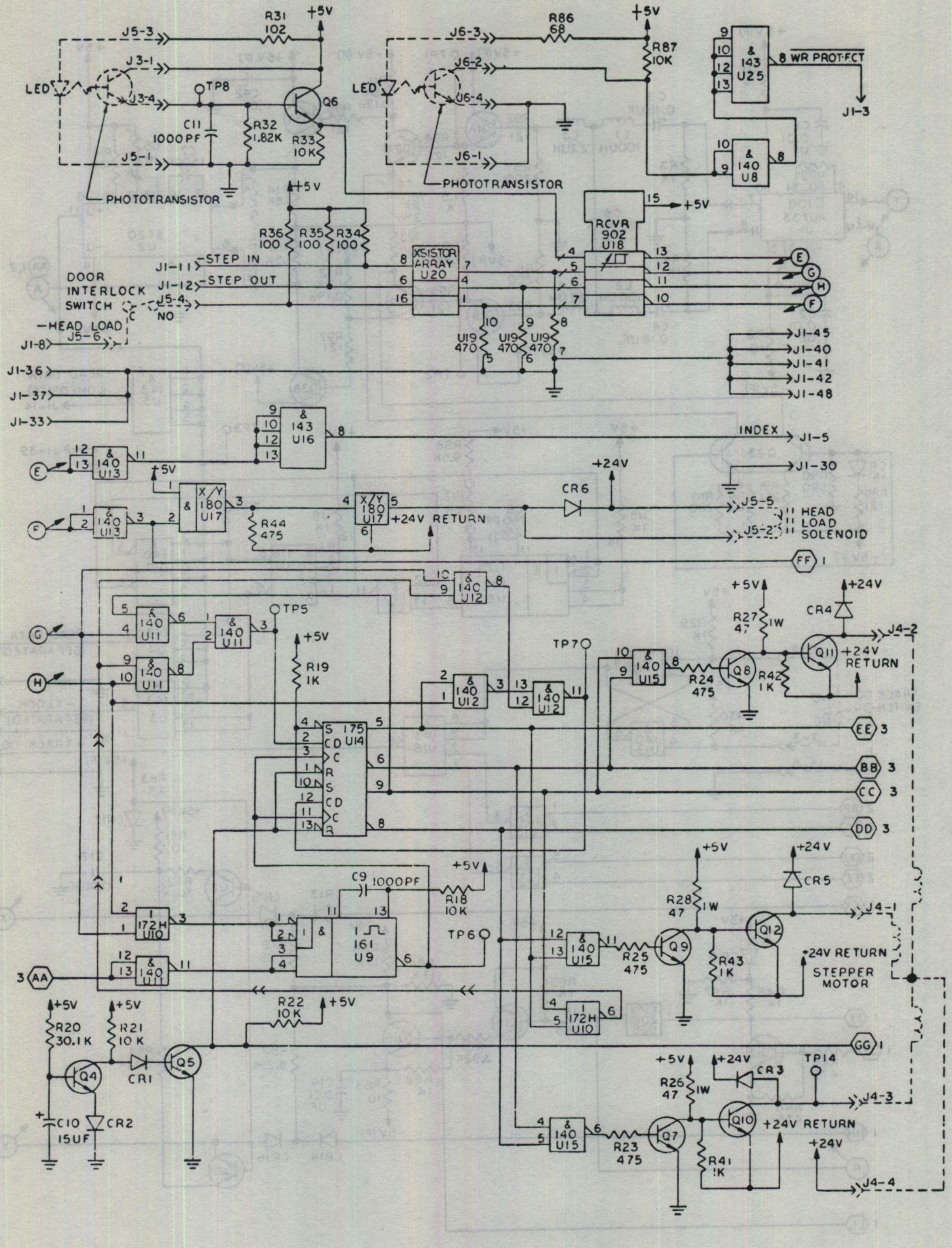


Figure 5—2. Schematics (Sheet 2 of 3)

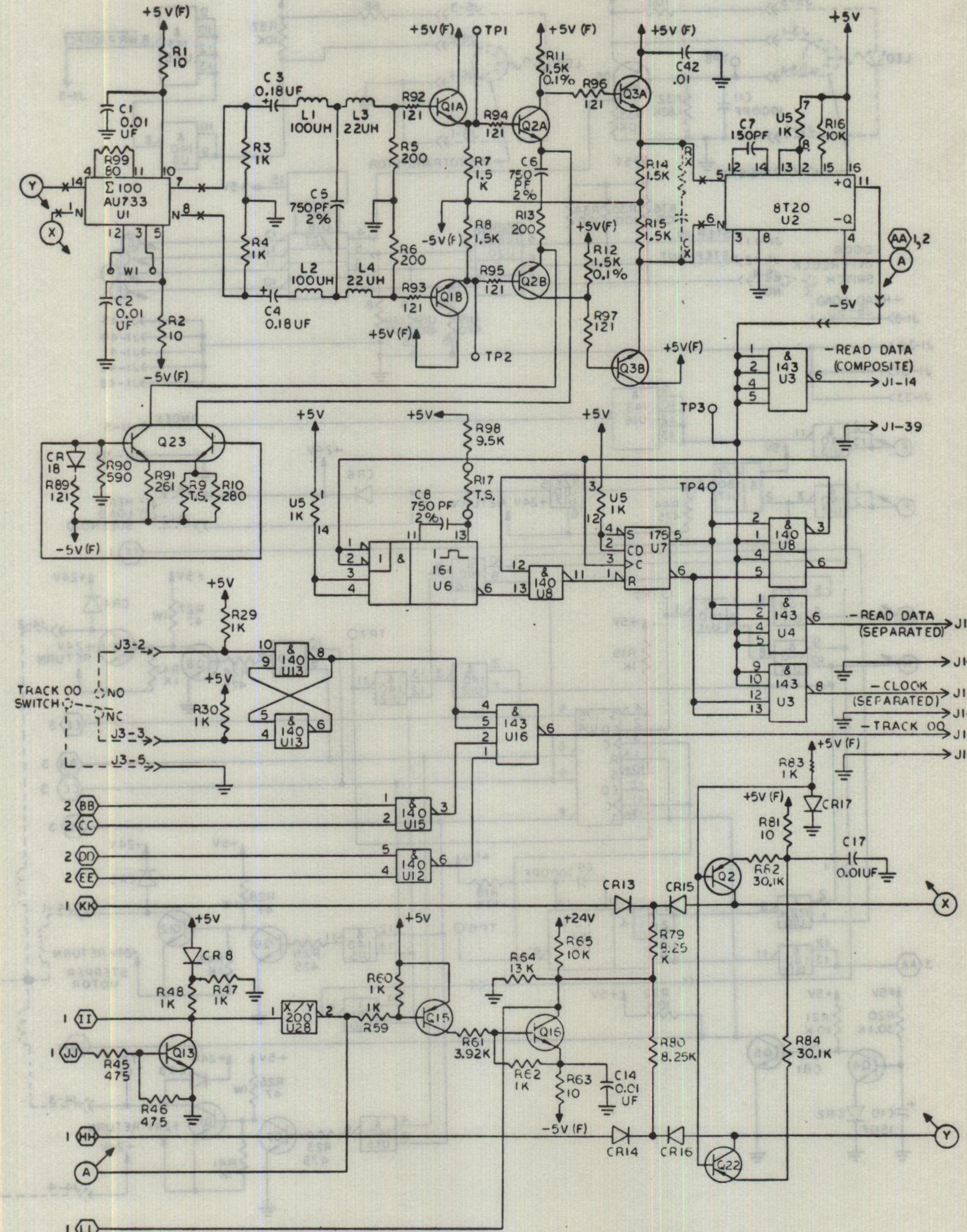


Figure 5–2. Schematics (Sheet 3 of 3)

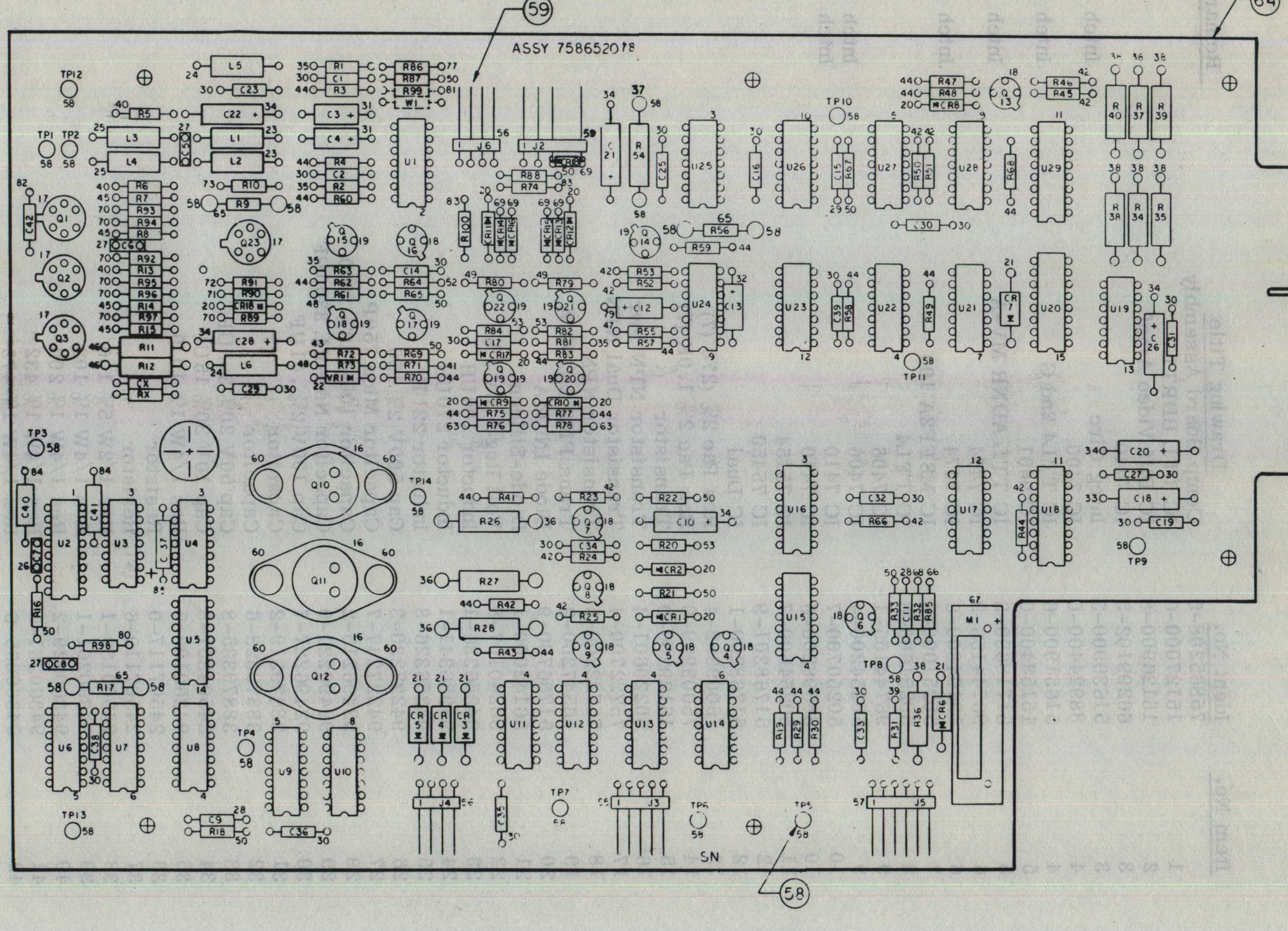


Figure 5–3. Assembly Drawing and Parts List (Sheet 1 of 3)

Item No.	Ident No.	Drawing Title	Remarks
	75865208-5	Comp Board Assembly	
1	15127000-6	IC TTL BDRTL	
2	15126900-8	IC Diff Video Ampf	
3	66299102-5	IC 7440	
3	51639900-3	Integ Circ	Intch
4	88924400-0	IC 7400	
4	51651900-6	IC TTL4 2nd G	Intch
5	15158400-0	IC 9601	
5	51718600-3	IC TTL ADNR MV-A	Intch
6	96744156-9	IC 7474	
6	15104800-6	IC 7474	Intch
7	50251000-1	IC MSFF2A 100	
8	50251600-8	IC TTL4	
9	96744155-1	IC 7406	
9	50254200-4	IC 7406	Intch
10	50250700-7	IC 7410	Intch
10	88698200-6	IC 7410	
11	50254500-7	IC 75154	
12	51768201-9	IC 75450	
12	51768200-1	IC Dual	
13	75009962-4	Res Pac 2% (270 (7)	
14	75009969-9	Res Pac 2% 1.0K (7)	
15	15129200-0	Transistor	
16	50220601-4	Transistor NPN Pwr	
17	75722700-4	Transistor Dual NPN	
18	75722200-5	Transistor NPN	
19	16547200-2	Trans PNP 2N2907A	
20	51736700-9	Diode IN914A	
21	56142000-1	Diode-Silicon	
22	50240107-8	Volt Reg 5.6V 5%	
23	94356336-1	Inductor 100UH	
24	94356341-1	Inductor 270UH	
25	94356326-8	Inductor 22UH	
26	94227230-3	Cap 500V 2% 150	
27	94227247-7	Capacitor Mica 750P	
28	92496215-2	Capacitor 100V 10% 1000	
29	92496221-0	Capacitor Non-EL 3300PF	
30	92496227-7	Cap 100V 2% .01UF	
31	38879319-2	Capacitor	
32	38879328-6	Capacitor	
33	38879335-8	Cap 50V 20% 3.9UF	
34	24504351-8	Cap 10V 20% 15UF	
35	94360100-5	Res 1/4W 1% 10.0	
36	24507117-0	Resistor	
37	24507119-6	Resistor	
38	24500139-1	Res 1/2W 5% 100	
39	94360201-1	Res 1/4W 1% 102	
40	94360229-2	Res 1/4W 1% 200	
41	94360261-5	Res 1/4W 1% 432	
42	94360265-6	Res 1/4W 1% 475	

Figure 5–3. Assembly Drawing and Parts List (Sheet 2 of 3)

Item No.	Ident No.	Drawing Title	Remarks
43	94360293-8	Res 1/4W 1% 931	
44	94360300-1	Res 1/4W 1% 1.00K	
45	94360317-5	Res 1/4W 1% 1.50K	
46	75721500-9	Resistor	
47	94360329-0	Res 1/4W 1% 2.00K	
48	94360357-1	Res 1/4W 1% 3.92K	
49	94360388-6	Res 1/4W 1% 8.25K	
50	94360400-9	Res 1/4W 1% 10.0K	
52	94360411-6	Res 1/4W 1% 13.0K	
53	94360446-2	Res 1/4W 1% 30.1K	
55	75743705-8	Header-Right Angle	
56	75743704-1	Header-Right Angle	
57	75743706-6	Header-Right Angle	
58	92498021-2	Terminal, Swaged	
59	75772401-8	Connector Hdr	
60	75738302-1	Rivet	
63	94360312-6	Res 1/4W 1% 1.33K	
64	75865106-1	BD PC FDD 360 RPM Mod D	
65	94357500-1	Resistor Test Select	Ref
66	92512653-4	Res 1/4W 22 Meg	
67	94257605-9	Meter-Elapsed Time M	
68	94360325-8	Res 1/4W 1% 1.82K	
69	83432400-6	Diode	
70	94360208-6	Res 1/4W 1% 121	
71	94360274-8	Res 1/4W 1% 590	
72	94360240-9	Res 1/4W 1% 261	
73	94360243-3	Res 1/4W 1% 280	
76	94217700-7	Nut-Self Lock, Stl 6	
77	92512248-3	Res 1/4W 68 Ohm	
79	92427007-7	Cap Electro .1UF 35V	
80	94360394-4	Res 1/4W 1% 9.53K	
81	94360187-2	Res 1/4W 1% 80.6	
82	75808537-7	Cap 100V 10% .01UF	
83	94360361-3	Res 1/4W 1% 4.32K	
84	75808549-2	Cap 100V 10% .10UF	
85	24504312-0	Cap 6V 20% 6.8UF	
86	83409905-3	Jumper PWB Solid Conn.	

Figure 5–3. Assembly Drawing and Parts List (Sheet 3 of 3)

VI

MAINTENANCE

6.1 INTRODUCTION

This section contains the instructions required to maintain the FDD. The information is provided in the form of preventive maintenance, troubleshooting and corrective maintenance.

6.2 MAINTENANCE TOOLS

The special tools (or equivalent) required to maintain an FDD are as follows:

DESCRIPTION	CDC PART NUMBER
Alignment Diskette	77832392
Outer Stop Gauge	83401300
Inner Stop Gauge	83401400
Feeler Gauge	12205633

The standard tools required to maintain the FDD are as follows:

- Socket Wrenches
  Sizes: 5/16" (7.94mm), 1/4" (6.35mm), 3/16" (4.76mm), 11/32" (8.73mm)
- Allen Wrenches
  Sizes: 0.050" (1.27mm), 1/16" (1.59mm), 5/64" (1.98mm), 7/64" (2.78mm)
- Oscilloscope, Tektronix 335, or Equivalent
- Feeler Gauges, Wire
  Sizes: 0.030" (0.762mm), 0.058" (1.47mm), 0.060" (1.52mm), 0.062" (1.58mm), 0.072" (1.83mm), 0.079" (2.01mm)
- Feeler Gauge, Shim; 0.072" (1.83mm)

6.3 PREVENTIVE MAINTENANCE

The head load pad should be inspected after 650 hours of head-load time. If pad is worn, dirty, torn or loose it should be replaced. (See Paragraph 6.7.4).

6.4 HEAD CLEANING

On occasions the Read/Write head may require cleaning. If this situation occurs clean head as follows:

CAUTION

Do not smoke while cleaning. Do not touch a head surface with fingers. Do not leave residue or lint on the head surfaces. Residual particles can result in a scored disk and/or loss of a head.

a. Use lint-free cloth to lightly drybuff head surface. Cleaning is completed if deposits are removed.

b. If oxide deposits were not removed in step (a), dampen (do not soak) cloth with head cleaning solution (91% isopropyl alcohol) and wipe head surface. Finish by lightly dry buffing again to ensure head is dry and no residue of the alcohol is left.

6.5 TROUBLESHOOTING

An improperly adjusted FDD may exhibit symptoms of one that has a malfunction; therefore, the Adjustment Procedures (Paragraph 6.6) should be performed before assuming that the unit has failed. If the malfunction still exists after the performance of the adjustment procedures, consult Table 6-1 and the Troubleshooting Flow Charts for the sumptoms observed, checks to be made, and action to be taken. Refer to Figure 6-1 for test points. Before troubleshooting is started, check all dc supply voltages.

Table 6–1. Flowchart References

Flow chart Paragraph No.	Symptoms
6.5.2	Diskette Not Rotating
6.5.3	Index Pulse Missing
6.5.4	Head Not Loading
6.5.5	Read/Write Head Stepping
6.5.6	No Track 00 Indication
6.5.7	Read Errors
6.5.8	Write Errors
6.5.9	Write Protect Inoperative

6.5.1 DC VOLTAGE CHECK

+5V ±5% at J1-18, and J1-19
-5V ±5% at J1-21, and J1-22
+24V ± 10% at J1-24, and J1-25 (Return at pins J1-49, J1-50).

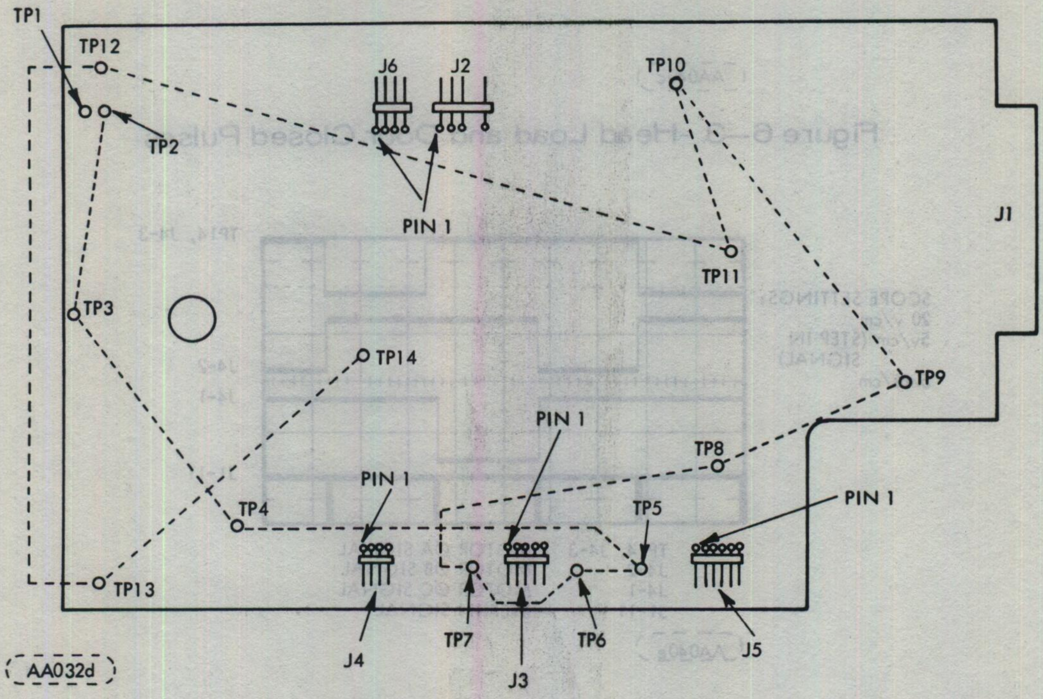


Figure 6.1 Test Points and Connector Locations

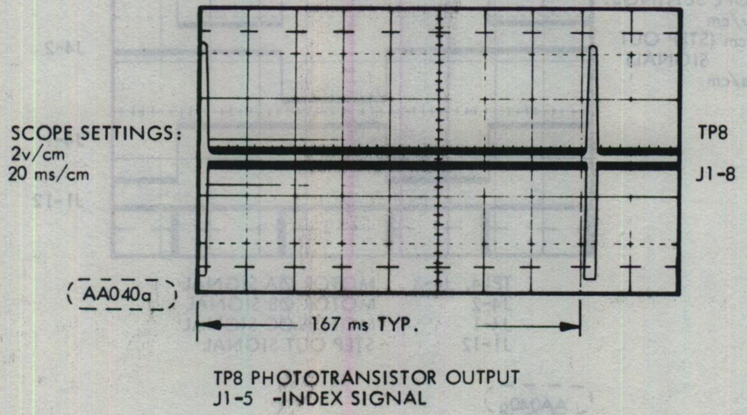


Figure 6–2 Phototransistor and -Index Signal Pulses

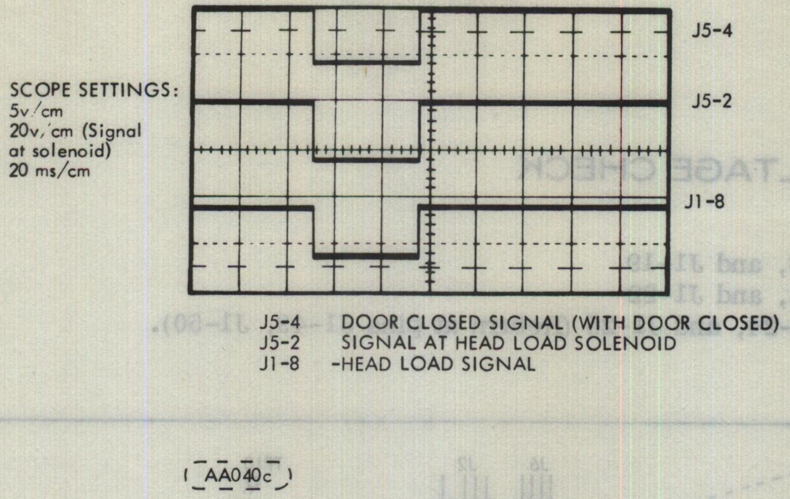

SCOPE SETTINGS:
5v/cm
20v/cm (Signal at solenoid)
20 ms/cm
J5-4
J5-2
J1-8
J5-4 DOOR CLOSED SIGNAL (WITH DOOR CLOSED)
J5-2 SIGNAL AT HEAD LOAD SOLENOID
J1-8 -HEAD LOAD SIGNAL
AA040c

Figure 6—3. -Head Load and Door Closed Pulses

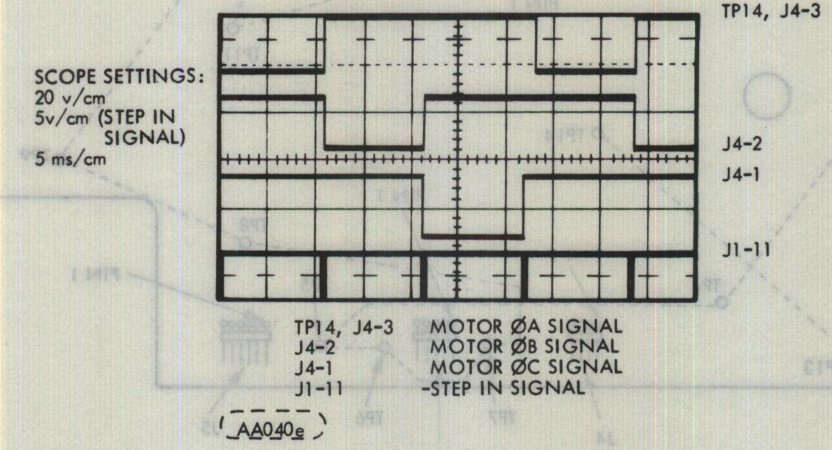


Figure 6—4. -Step In and Motor Phase Pulses

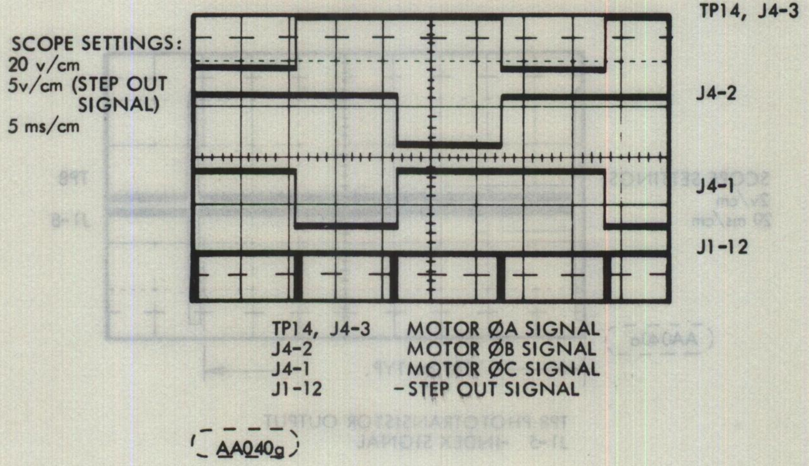
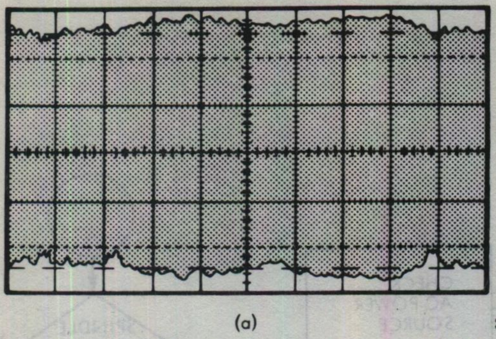


Figure 6—5. -Step Out and Motor Phase Pulses

SCOPE SETTINGS:
200 mv/cm
20 ms/cm

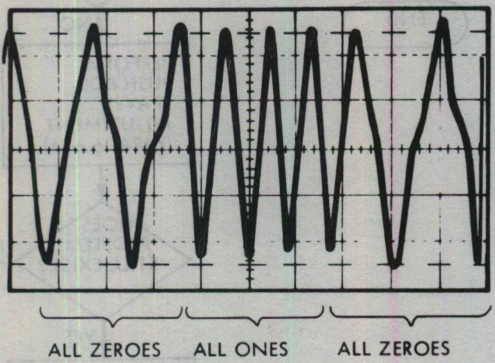


TP1 & 2
APPROX. AMPLITUDE RANGE
500mv -2000mv*
250mv-1800mv**

*All zeros
**All ones

Figure 6–6. Differential Read Signal for Entire Track

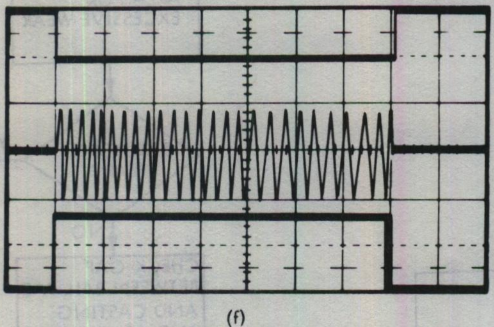
SCOPE SETTINGS:
200 mv/cm
10 us/cm



TP1 & 2

Figure 6–7. Differential Read Signal for Portion of Track

SCOPE SETTINGS:
5v/cm(Write Enable)
5 ma/cm (Write Current)
50 ma/cm (Erase Current)
20 ms/cm

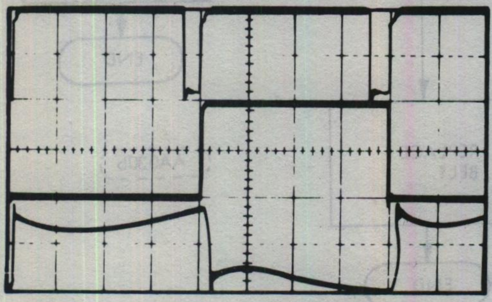


J1-10
J2-1, J2-2
J2-3

Figure 6–8. Write Enable Voltage and Write and Erase Currents

J1-10 WRITE ENABLE
J2-1, J2-2 WRITE CURRENT (THROUGH HEAD)
J2-3 ERASE CURRENT (THROUGH HEAD)

SCOPE SETTINGS:
2v/cm
5 ma/cm (Write Current)
0.5 us/cm

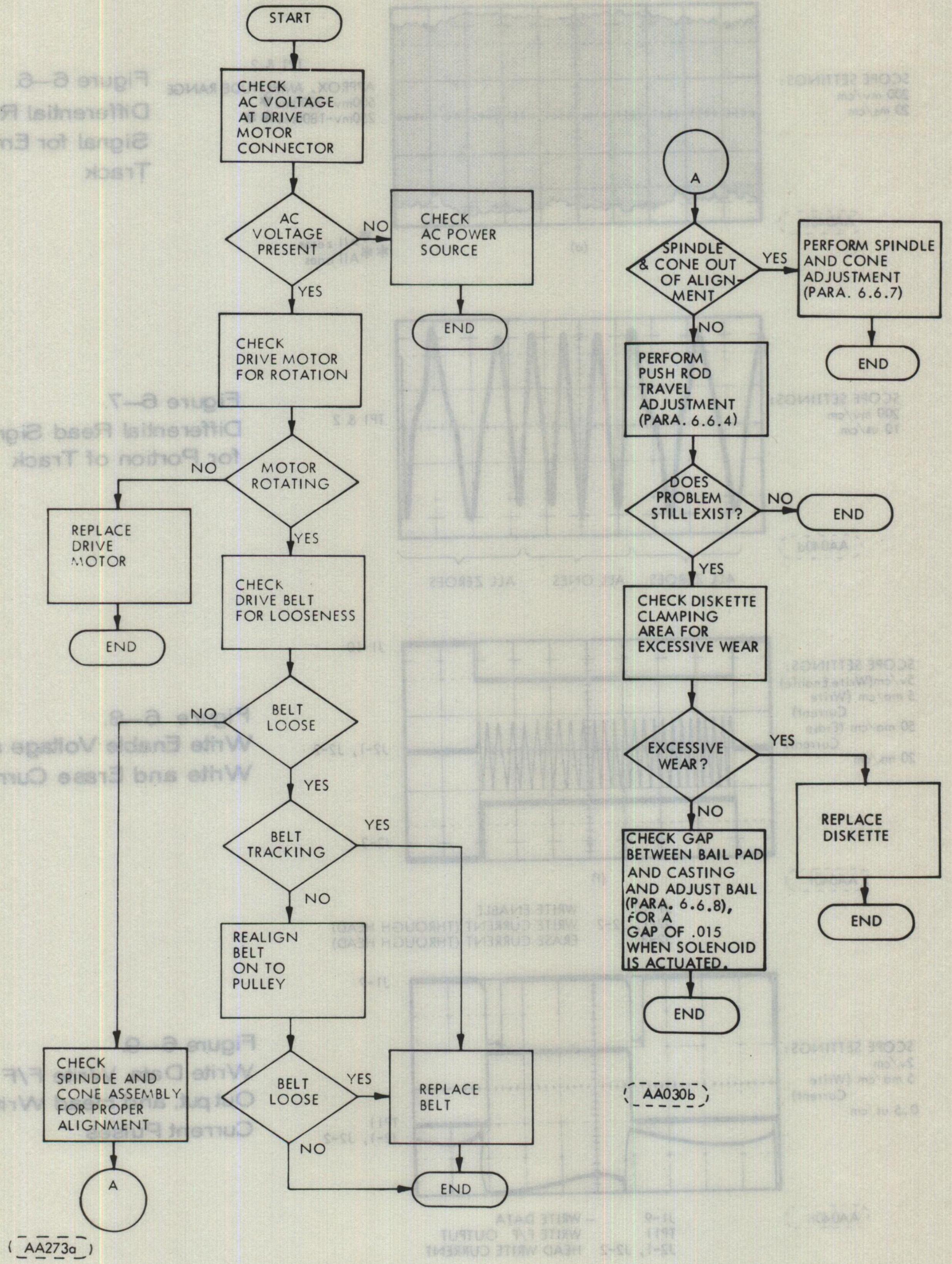


J1-9
TP11
J2-1, J2-2

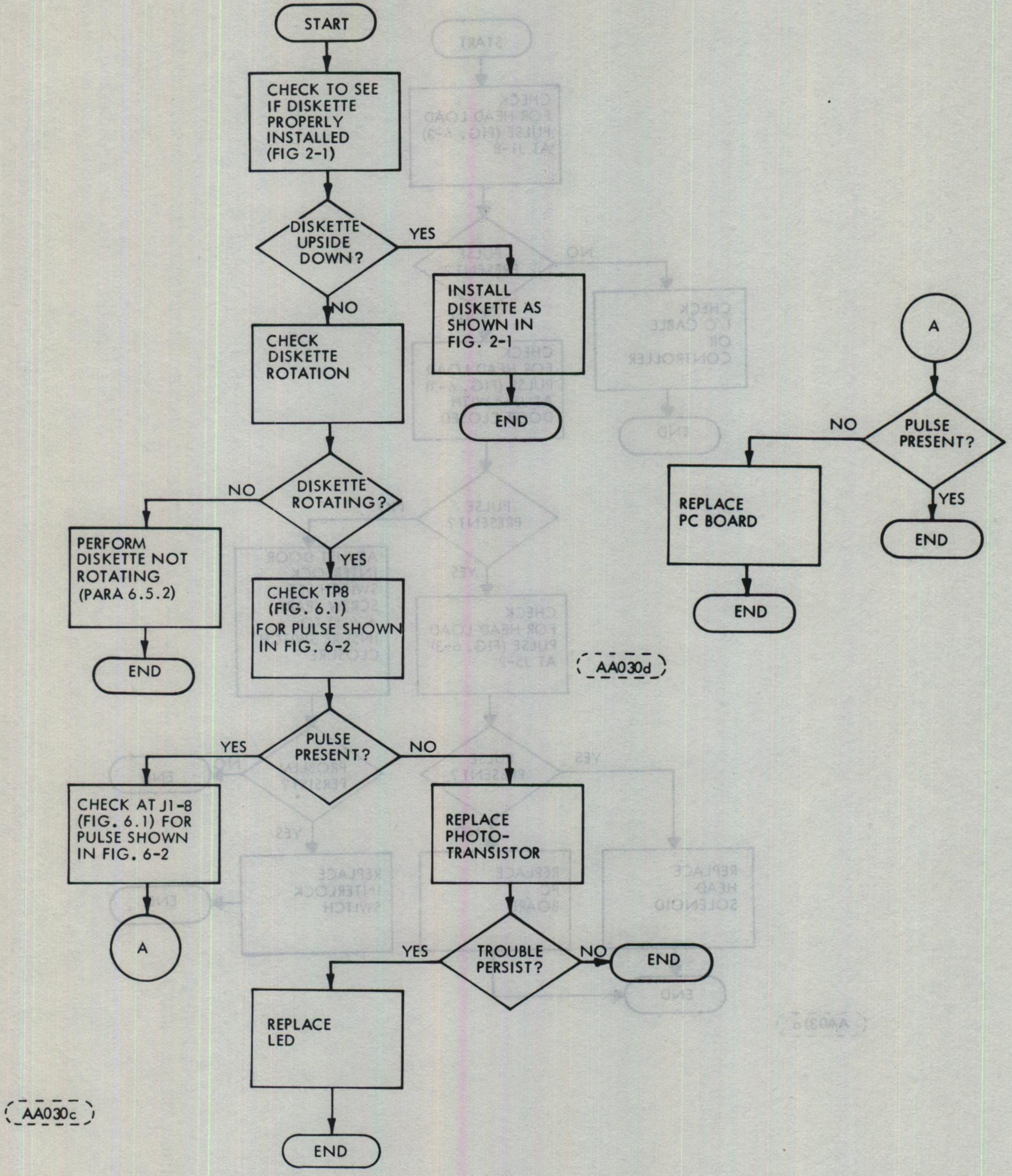
Figure 6–9. Write Data, Write F/F Output, and Head Write Current Pulses

J1-9 – WRITE DATA
TP11 WRITE F/F OUTPUT
J2-1, J2-2 HEAD WRITE CURRENT

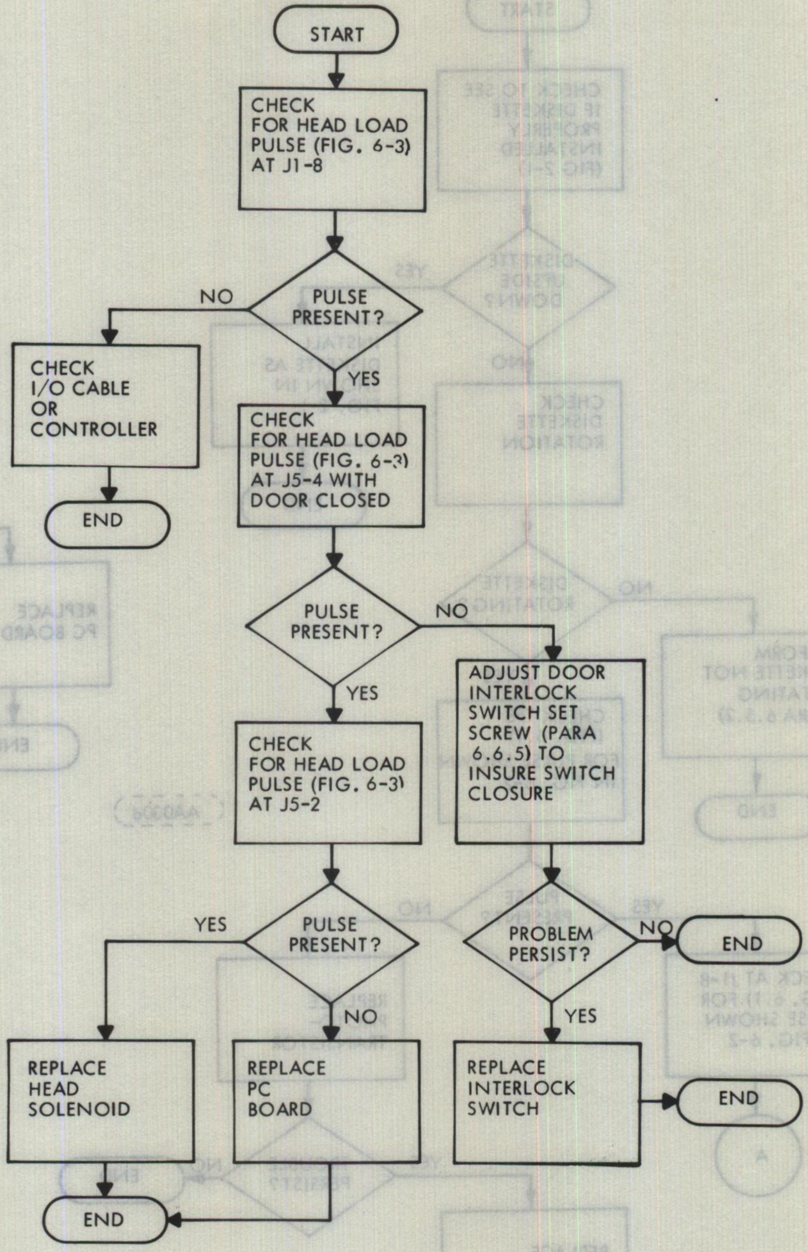
6.5.2 DISKETTE NOT ROTATING


START
CHECK AC VOLTAGE AT DRIVE MOTOR CONNECTOR
AC VOLTAGE PRESENT
NO
CHECK AC POWER SOURCE
END
YES
CHECK DRIVE MOTOR FOR ROTATION
MOTOR ROTATING
NO
REPLACE DRIVE MOTOR
END
YES
CHECK DRIVE BELT FOR LOOSENESS
BELT LOOSE
NO
YES
BELT TRACKING
YES
NO
REALIGN BELT ON TO PULLEY
BELT LOOSE
YES
REPLACE BELT
NO
END
CHECK SPINDLE AND CONE ASSEMBLY FOR PROPER ALIGNMENT
A
A
SPINDLE & CONE OUT OF ALIGNMENT
YES
PERFORM SPINDLE AND CONE ADJUSTMENT (PARA. 6.6.7)
END
NO
PERFORM PUSH ROD TRAVEL ADJUSTMENT (PARA. 6.6.4)
DOES PROBLEM STILL EXIST?
NO
END
YES
CHECK DISKETTE CLAMPING AREA FOR EXCESSIVE WEAR
EXCESSIVE WEAR?
YES
REPLACE DISKETTE
END
NO
CHECK GAP BETWEEN BAIL PAD AND CASTING AND ADJUST BAIL (PARA. 6.6.8), FOR A GAP OF .015 WHEN SOLENOID IS ACTUATED.
END
AA030b
AA273a

6.5.3 INDEX PULSE MISSING


START
CHECK TO SEE IF DISKETTE PROPERLY INSTALLED (FIG 2-1)
DISKETTE UPSIDE DOWN?
YES
INSTALL DISKETTE AS SHOWN IN FIG. 2-1
END
NO
CHECK DISKETTE ROTATION
DISKETTE ROTATING?
NO
PERFORM DISKETTE NOT ROTATING (PARA 6.5.2)
END
YES
CHECK TP8 (FIG. 6.1) FOR PULSE SHOWN IN FIG. 6-2
PULSE PRESENT?
YES
CHECK AT J1-8 (FIG. 6.1) FOR PULSE SHOWN IN FIG. 6-2
A
NO
REPLACE PHOTO-TRANSISTOR
TROUBLE PERSIST?
YES
REPLACE LED
END
NO
END
A
PULSE PRESENT?
NO
REPLACE PC BOARD
END
YES
END
AA030d
AA030c

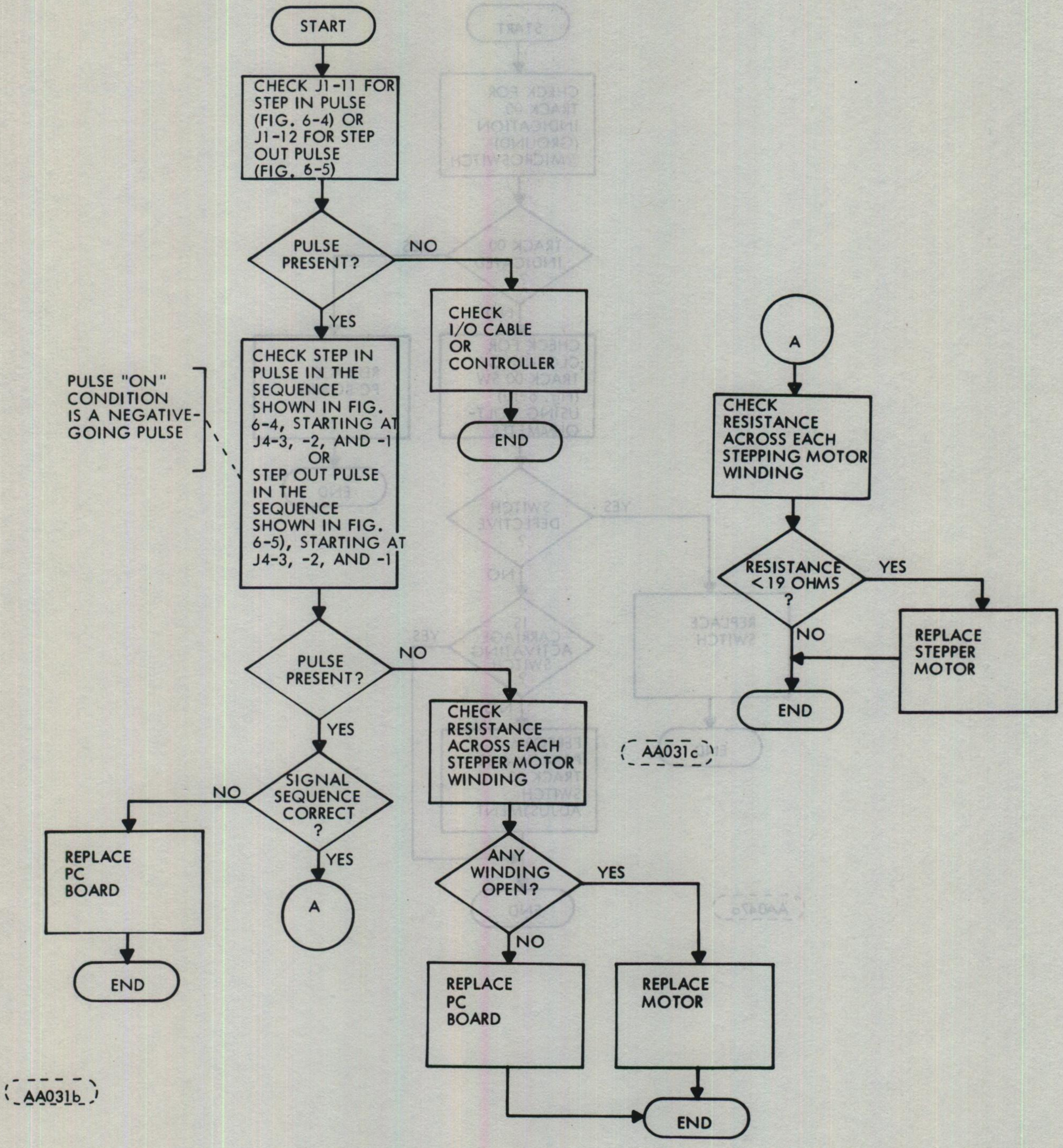
6.5.4 HEAD NOT LOADING



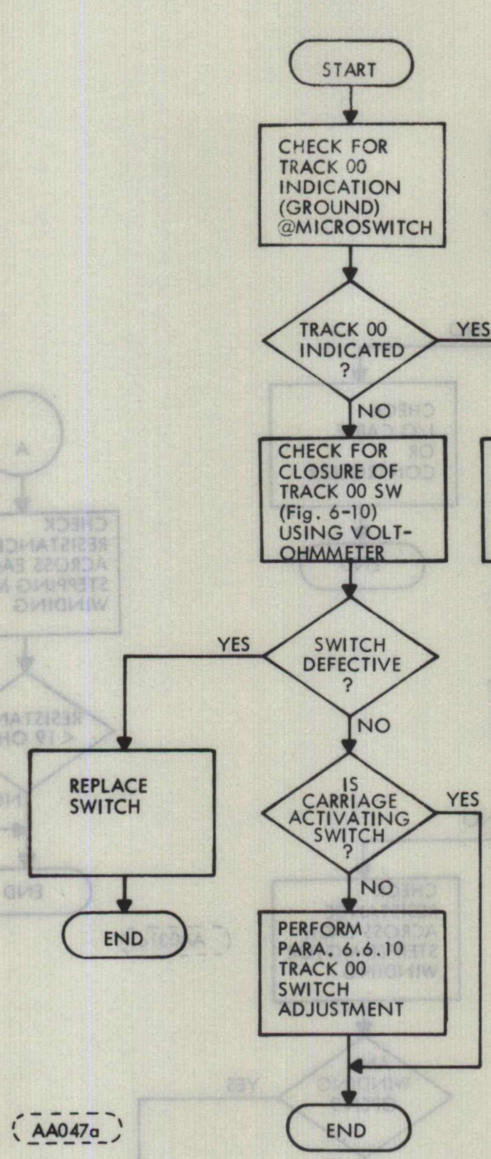
START
CHECK FOR HEAD LOAD PULSE (FIG. 6-3) AT J1-8
PULSE PRESENT?
NO
YES
CHECK I/O CABLE OR CONTROLLER
END
CHECK FOR HEAD LOAD PULSE (FIG. 6-3) AT J5-4 WITH DOOR CLOSED
PULSE PRESENT?
NO
YES
ADJUST DOOR INTERLOCK SWITCH SET SCREW (PARA 6.6.5) TO INSURE SWITCH CLOSURE
CHECK FOR HEAD LOAD PULSE (FIG. 6-3) AT J5-2
PULSE PRESENT?
YES
NO
PROBLEM PERSIST?
NO
YES
END
REPLACE HEAD SOLENOID
REPLACE PC BOARD
REPLACE INTERLOCK SWITCH
END
END

AA031a

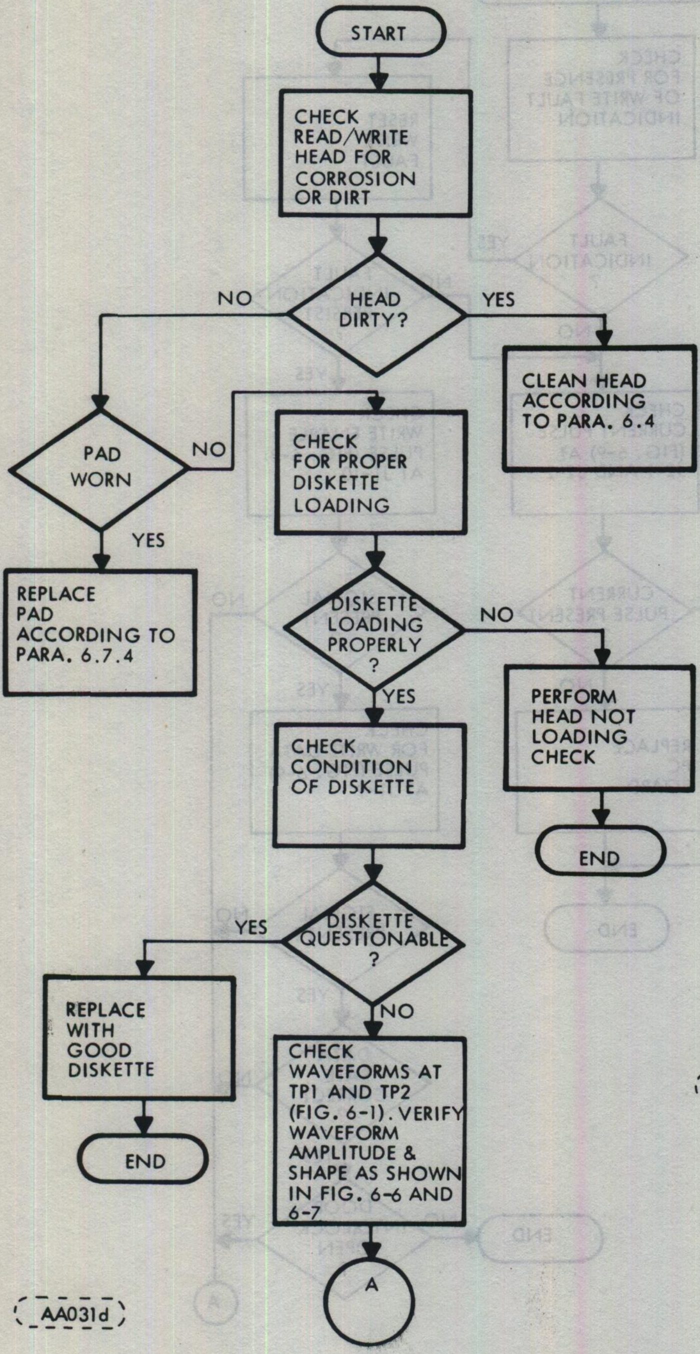
6.5.5 READ/WRITE HEAD STEPPING


START
CHECK J1-11 FOR STEP IN PULSE (FIG. 6-4) OR J1-12 FOR STEP OUT PULSE (FIG. 6-5)
PULSE PRESENT?
NO
CHECK I/O CABLE OR CONTROLLER
END
YES
PULSE "ON" CONDITION IS A NEGATIVE-GOING PULSE
CHECK STEP IN PULSE IN THE SEQUENCE SHOWN IN FIG. 6-4, STARTING AT J4-3, -2, AND -1 OR STEP OUT PULSE IN THE SEQUENCE SHOWN IN FIG. 6-5), STARTING AT J4-3, -2, AND -1
PULSE PRESENT?
NO
CHECK RESISTANCE ACROSS EACH STEPPER MOTOR WINDING
ANY WINDING OPEN?
YES
REPLACE MOTOR
NO
REPLACE PC BOARD
END
YES
SIGNAL SEQUENCE CORRECT ?
NO
REPLACE PC BOARD
END
YES
A
AA031b
A
CHECK RESISTANCE ACROSS EACH STEPPING MOTOR WINDING
RESISTANCE <19 OHMS ?
YES
REPLACE STEPPER MOTOR
NO
END
AA031c

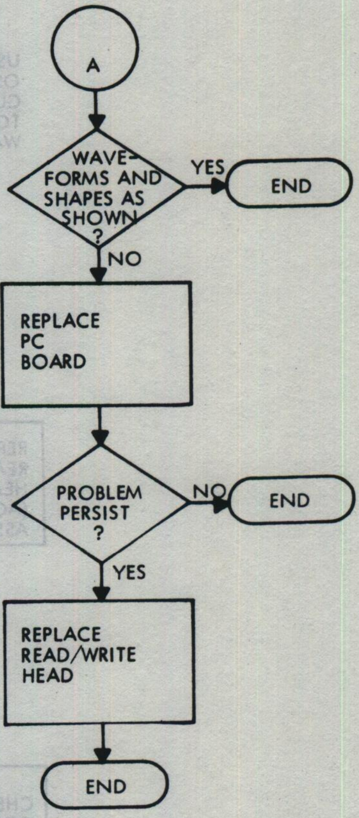
6.5.6 NO TRACK 00 INDICATOR


START
CHECK FOR TRACK 00 INDICATION (GROUND) @MICROSWITCH
TRACK 00 INDICATED ?
YES
NO
REPLACE PC BOARD
END
CHECK FOR CLOSURE OF TRACK 00 SW (Fig. 6-10) USING VOLT-OHMMETER
SWITCH DEFECTIVE ?
YES
NO
REPLACE SWITCH
END
IS CARRIAGE ACTIVATING SWITCH ?
YES
NO
PERFORM PARA. 6.6.10 TRACK 00 SWITCH ADJUSTMENT
END
AA047a

6.5.7 READ ERRORS

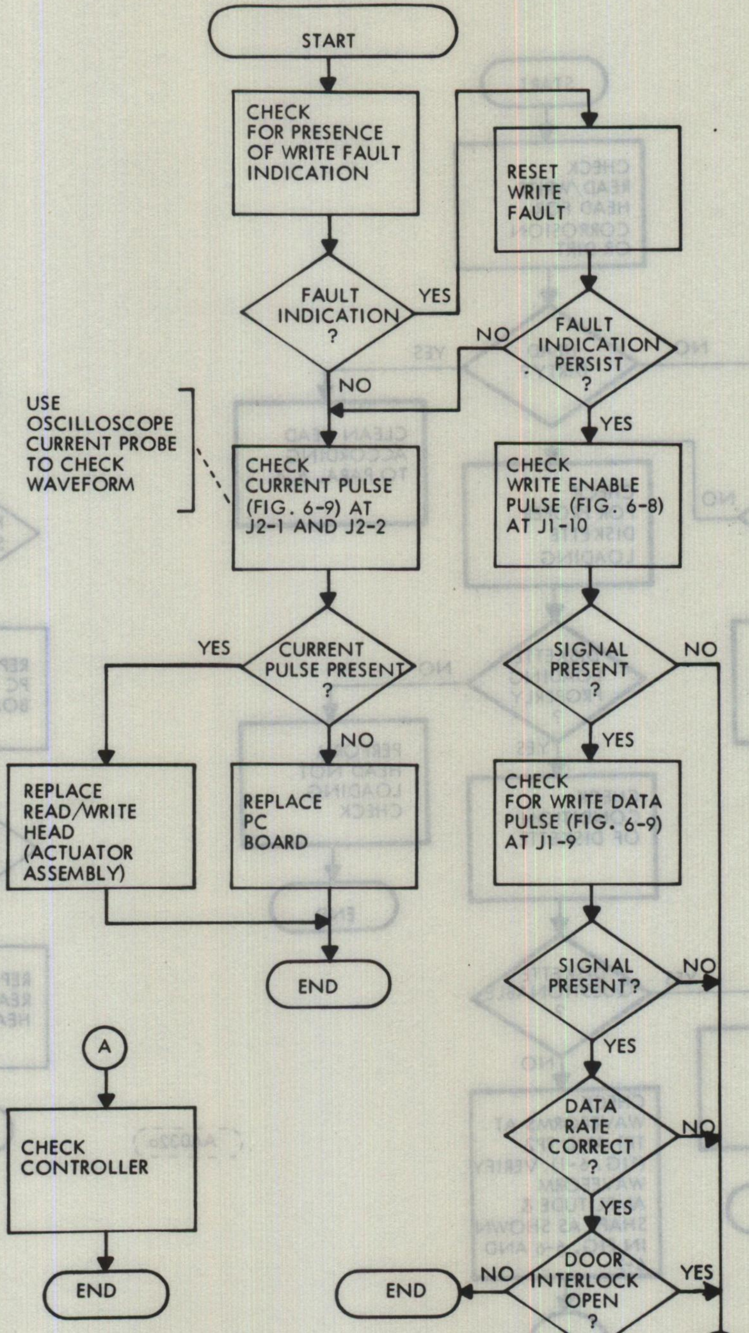

START
CHECK READ/WRITE HEAD FOR CORROSION OR DIRT
HEAD DIRTY?
NO
YES
CLEAN HEAD ACCORDING TO PARA. 6.4
PAD WORN
NO
YES
REPLACE PAD ACCORDING TO PARA. 6.7.4
CHECK FOR PROPER DISKETTE LOADING
DISKETTE LOADING PROPERLY ?
NO
PERFORM HEAD NOT LOADING CHECK
END
YES
CHECK CONDITION OF DISKETTE
DISKETTE QUESTIONABLE ?
YES
REPLACE WITH GOOD DISKETTE
END
NO
CHECK WAVEFORMS AT TP1 AND TP2 (FIG. 6-1). VERIFY WAVEFORM AMPLITUDE & SHAPE AS SHOWN IN FIG. 6-6 AND 6-7
A

AA031d



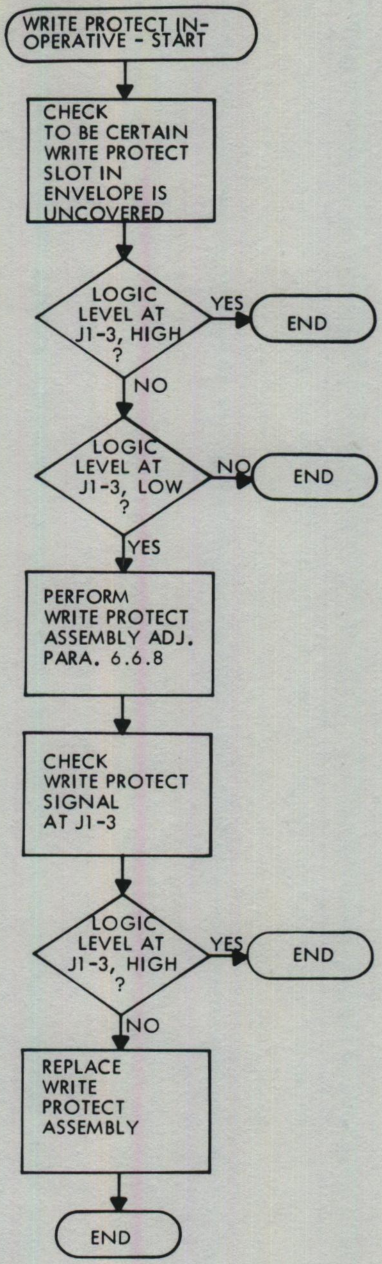
AA032a

6.5.8 WRITE ERRORS


START
CHECK FOR PRESENCE OF WRITE FAULT INDICATION
FAULT INDICATION ?
YES
NO
RESET WRITE FAULT
FAULT INDICATION PERSIST ?
NO
YES
USE OSCILLOSCOPE CURRENT PROBE TO CHECK WAVEFORM
CHECK CURRENT PULSE (FIG. 6-9) AT J2-1 AND J2-2
CURRENT PULSE PRESENT ?
YES
NO
REPLACE READ/WRITE HEAD (ACTUATOR ASSEMBLY)
REPLACE PC BOARD
END
CHECK WRITE ENABLE PULSE (FIG. 6-8) AT J1-10
SIGNAL PRESENT ?
NO
YES
CHECK FOR WRITE DATA PULSE (FIG. 6-9) AT J1-9
SIGNAL PRESENT?
NO
YES
DATA RATE CORRECT ?
NO
YES
DOOR INTERLOCK OPEN ?
NO
YES
END
A
A
CHECK CONTROLLER
END

AA032b

6.5.9 WRITE PROTECT INOPERATIVE



WRITE PROTECT IN-OPERATIVE - START
CHECK TO BE CERTAIN WRITE PROTECT SLOT IN ENVELOPE IS UNCOVERED
LOGIC LEVEL AT J1-3, HIGH ?
YES
END
NO
LOGIC LEVEL AT J1-3, LOW ?
NO
END
YES
PERFORM WRITE PROTECT ASSEMBLY ADJ. PARA. 6.6.8
CHECK WRITE PROTECT SIGNAL AT J1-3
LOGIC LEVEL AT J1-3, HIGH ?
YES
END
NO
REPLACE WRITE PROTECT ASSEMBLY
END

AA032c

6.6 ADJUSTMENT PROCEDURES

6.6.1 Paragraph Not Used

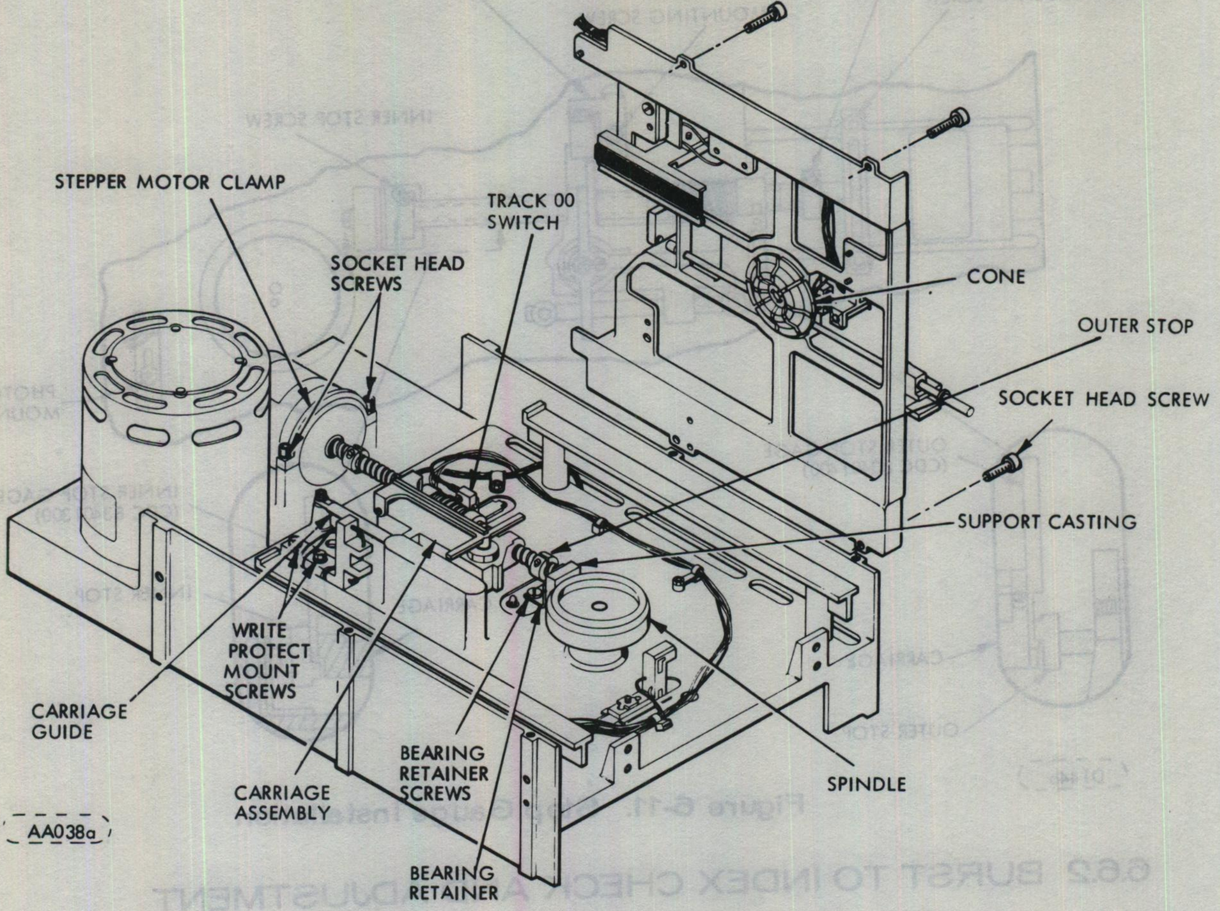


Figure 6–10. Base and Chassis Support Assembly

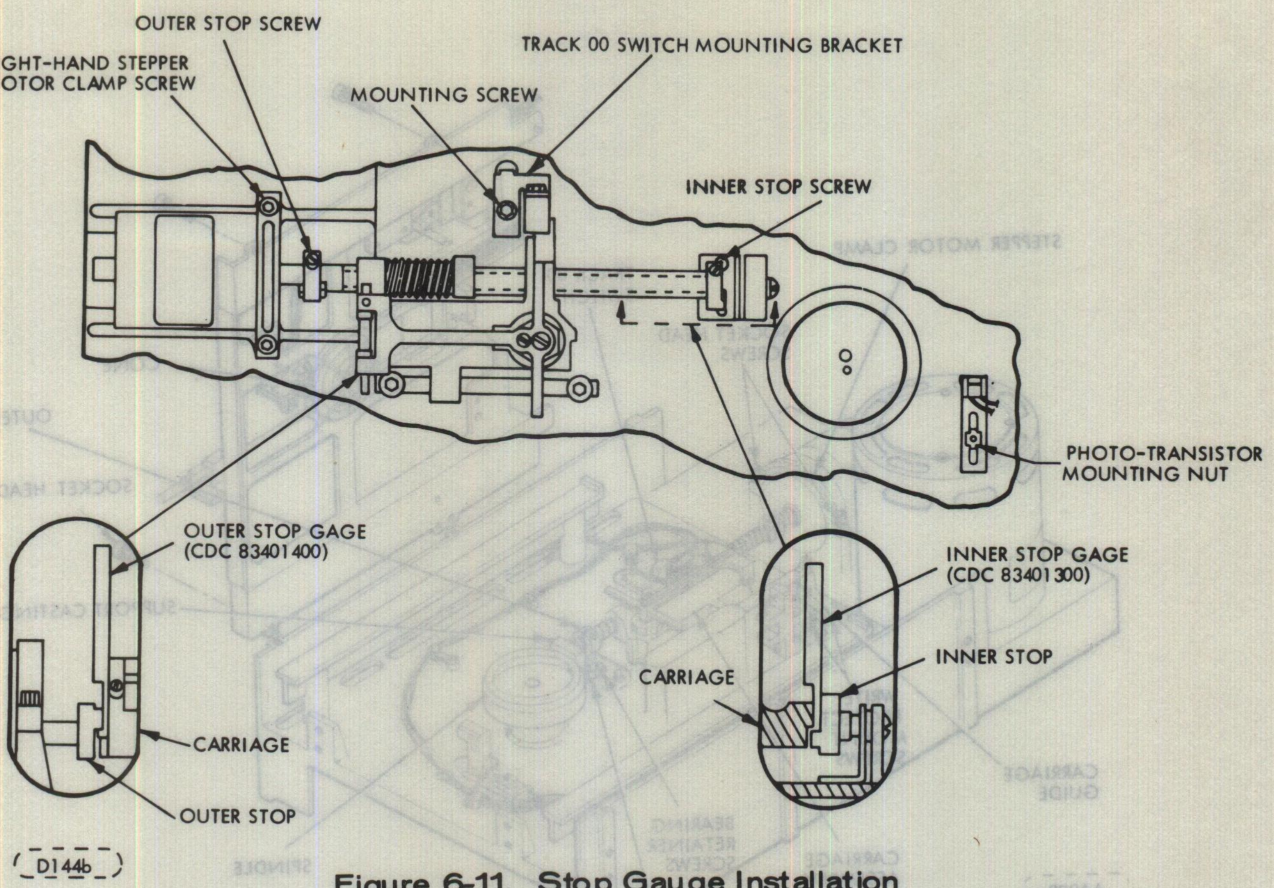

OUTER STOP SCREW
RIGHT-HAND STEPPER MOTOR CLAMP SCREW
TRACK 00 SWITCH MOUNTING BRACKET
MOUNTING SCREW
INNER STOP SCREW
PHOTO-TRANSISTOR MOUNTING NUT
OUTER STOP GAGE (CDC 83401400)
CARRIAGE
OUTER STOP
INNER STOP GAGE (CDC 83401300)
INNER STOP
CARRIAGE
D144b

Figure 6-11. Stop Gauge Installation

6.6.2 BURST TO INDEX CHECK AND ADJUSTMENT

The Alignment Diskette is used to perform this procedure.

a. The Alignment Diskette (CDC 77832392) should be preconditioned by allowing it to reach room temperature for one hour.

b. Install the alignment diskette.

> The Alignment Diskette is for read operation only. Extreme caution should be used to assure this diskette is not written on.

c. Seek to Track Zero, then seek to Track one and read. (No data is recorded on either Tracks One or Zero.)

d. Connect Channel 1 of the scope to TP1 on the PWA, Channel 2 to Index (by means of an IC clip) on U20, Pin 8 of the PWA. Set up the scope as follows:

Chan 1 Volt/Div To: 0.1 volt/div
Chan 2 Volt/Div To: 2 volt/div

Chan 1 voltage to: AC
Chan 2 voltage to: AC

Source to: Chan 1
Coupling to: Low Freq. (Hi Freq. Reject)

Vert. Mode To: Add
Slope (Sync) To: Pos.

Trig. Mode To: Normal
Time Base To: 50/us/div

e. Adjust the time from write splice bit to the leading edge of the index pulse until it measures 150 ±60us (from 90 us to 210 us). (Refer to Figure 6-12 to adjust the write splice to index time, loosen the Allen head screw holding the phototransistor located on bottom of chassis toward the front of the unit.) Using the adjustment handle protruding through the casting, move the phototransistor until the specification is met. Tighten the Allen screw while observing the scope signal. Verify that the adjustment did not change. If the adjustment cannot be achieved, it may be necessary to adjust the LED sensor located on the top plate assembly.

f. After the adjustment has been made and specification met, change the scope time base to 0.5 ms/div and verify that the index pulse width measures 1.5 ±0.6 ms (from 0.9 ms to 2.1ms). If the index pulse width is not within specification, adjust the LED sensor located on the top plate assembly. If the pulse width cannot be adjusted to meet specifications, the sensor assembly or PWA must be replaced and steps "a" through "f" repeated.

g. Seek to Track Zero then seek to track 76 and read. Scope is to remain set as defined in the original setup in step "d". It may be necessary to adjust the sync level slightly to stabilize the trace. Verify that the time from the write splice bit to the leading edge of the index pulse is 150 ±60 us (from 90 us to 210 us). (Refer to Figure 6-12). If the specification is not met, perform the adjustment routine defined in step "e" including the verification of the index pulse width in Step "f".

h. All scope settings are to remain as defined in the original setup in step "d", but it may be necessary to slightly adjust the sync. Seek to track 00 then seek to track 1 and perform a read. While observing the signal on the scope, remove and reinsert the diskette three times.

After each insertion, verify that the change in the time from write splice to leading edge of index is less than 50 us. If the change is greater than 50 us, the cone and spindle must be aligned or replaced (see section 6.6.7) and steps "a" through "h" repeated.

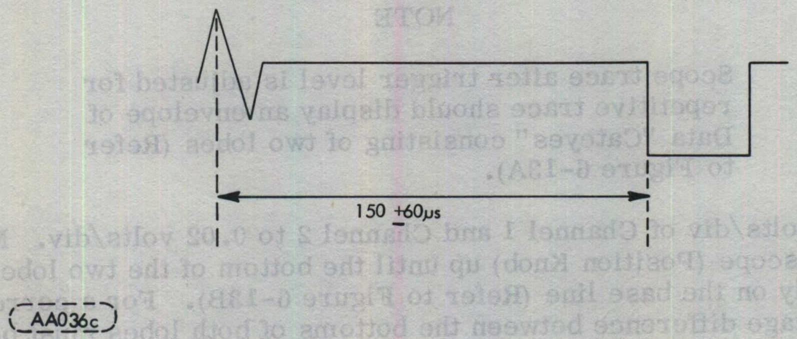


Figure 6–12. Write Splice Bit to Index Timing

6.6.3 ACTUATOR ALIGNMENT (Diskette)

The Alignment Diskette is used to perform this procedure.

a. The Alignment Diskette (CDC 77832392) should be preconditioned by allowing it to reach room temperature for one hour.

b. Install the alignment diskette.

CAUTION

> The alignment diskette is for read operation only. Extreme caution should be used to assure this diskette is not written on. In addition, be sure diskette is removed from unit before AC or DC power is turned off at tester or user system.

c. Step to track 38 (00100110) and perform a read. (No data is recorded on Track 38).

d. Connect Channel 1 of scope to TP1 on the PWA and Channel 2 to TP2 on the PWA.

e. Connect the external sync probe to index at U16 pin 8 on PWA by means of an IC clip.

f. Set up the scope as follows:

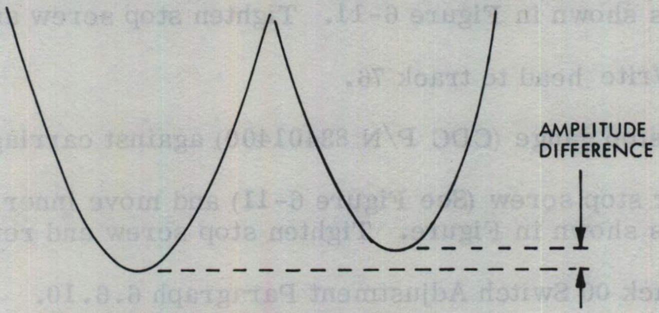
Channel 1: volts/div to: 0.1 volts/div
Channel 2: volts/div to: 0.1 volts/div (inverted)
Channel 1: input to: AC
Channel 2: inputs to: AC
Vertical Mode to: Add
Slope (Sync) to: Positive
Trigger Source to: External
Trigger Coupling to: Low Frequency (High Frequency Reject)
Trigger Mode to: Normal
Time Base to: 20 msec/div

NOTE

> Scope trace after trigger level is adjusted for repetitive trace should display an envelope of Data "Cateyes" consisting of two lobes (Refer to Figure 6-13A).

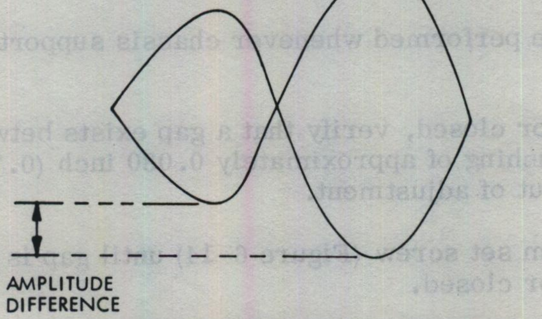
g. Change the volts/div of Channel 1 and Channel 2 to 0.02 volts/div. Move the trace on the scope (Position Knob) up until the bottom of the two lobes are setting approximately on the base line (Refer to Figure 6-13B). For a correctly aligned unit, the voltage difference between the bottoms of both lobes must be less than 25 mV.

h. **If not in alignment, loosen the stepper motor clamp mounting screws to where a gap exists between the clamp and casting (See Figure 6-14) and slowly rotate the stepper motor to adjust the amplitude until the amplitude of both lobes is the same, that is, the difference between the bottoms of both lobes is less than 5mV.**



A - "CATEYES" FINAL HEAD ALIGNMENT

AA042a



B - "CATEYES" PRELIMINARY HEAD ALIGNMENT

AA042b

Figure 6—13. Head Alignment Amplitude

i. Tighten the stepper motor clamp. Return to track 00, then seek back to track 38. Verify that the 5mv specification is still met. If the specification is not met, readjust the stepper motor, return to zero and seek back to track 38. Repeat the adjustment until the 5mv specification is met.

j. Remove alignment diskette.

k. Place outer stop gauge (CDC P/N 83401300) against carriage as shown in Figure 6-11.

l. Loosen outer stop screw (see Figure 6-11) and move outer stop until tooth contacts stop gauge as shown in Figure 6-11. Tighten stop screw and remove gauge.

m. Step Read/Write head to track 76.

n. Place inner stop gauge (CDC P/N 83401400) against carriage as shown in Figure 6-11.

o. Loosen inner stop screw (See Figure 6-11) and move inner stop until it contacts stop gauge as shown in Figure. Tighten stop screw and remove gauge.

p. Perform Track 00 Switch Adjustment Paragraph 6.6.10.

q. Recheck all adjustments made in this procedure and repeat all steps having out-of-tolerance indications.

6.6.4 PUSH ROD TRAVEL ADJUSTMENT

This procedure must be performed whenever chassis support (Figure 6-14) is removed and replaced.

a. With front panel door closed, verify that a gap exists between the retaining ring and the disk load bushing of approximately 0.030 inch (0.762mm) (refer to Fig. 6-14). Perform step b if out of adjustment.

b. Adjust disk load arm set screw (Figure 6-14) until gap is approximately 0.030 inch, (0.762mm) with door closed.

c. Proceed to Door Interlock Switch Adjustment (paragraph 6.6.5)

6.6.5 DOOR INTERLOCK SWITCH ADJUSTMENT

This procedure must be performed whenever the Push Rod Travel Adjustment procedure is performed.

a. **Verify that interlock switch closes (when closing the door) prior to the door latching. Perform step (b) if switch and door are out of sync.**

b. **With door closed, adjust set-screw at end of disk load arm (Figure 6-14) while holding door closed against metal stop. Adjust set-screw until micro-switch is almost adjusted flush to top of switch case. This ensures that as the nylon tips on the push-rod wear down, the switch will still close.**

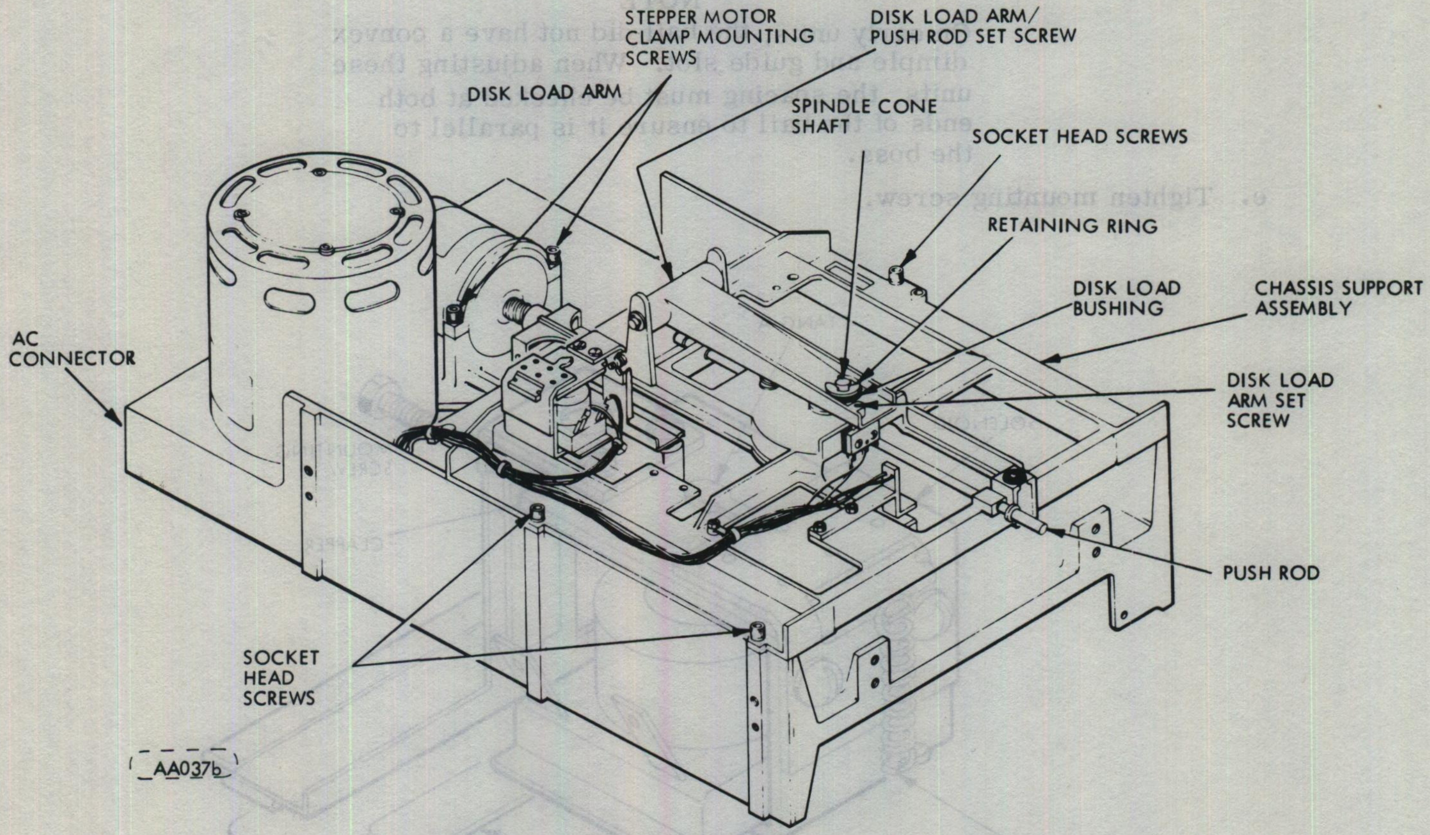


Figure 6—14. Chassis Base Assembly

6.6.6 DISK LOAD SOLENOID ADJUSTMENT

This procedure must be performed whenever the solenoid or bail are removed or the screw holding the bail becomes loose.

a. Place a 0.072" (1.83 mm) feeler gauge on boss of bottom support casting underneath bail.

NOTE

Caution must be taken to ensure gauge is not under foam padding.

b. Energize solenoid.

c. Loosen mounting screw on bail (Figure 6-14).

d. Adjust Bail so it is flat against the top of the gauge.

NOTE

On early units, the bail did not have a convex dimple and guide slot. When adjusting these units, the spacing must be checked at both ends of the bail to ensure it is parallel to the boss.

e. Tighten mounting screw.

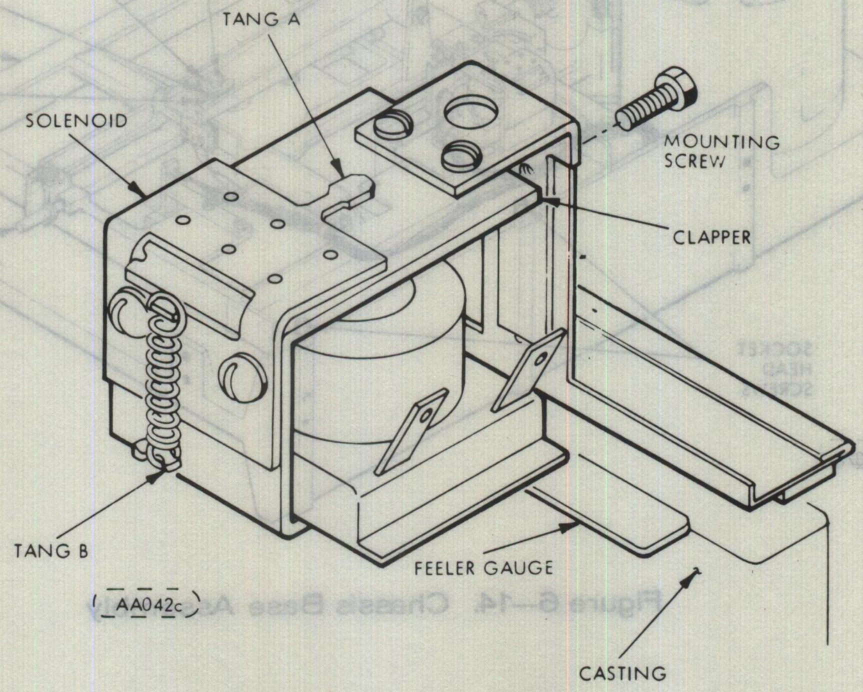


Figure 6—15. Disk Load Solenoid

6.6.7 SPINDLE AND CONE ADJUSTMENT

This procedure must be performed whenever the spindle and cone are out of alignment or whenever the actuator assembly is removed, replaced or mechanically aligned.

a. Loosen chassis support assembly (Figure 6-14).
b. Position chassis assembly by pushing down on the spindle cone shaft so cone seats in the spindle (Figure 6-16).
c. Slowly close door without spindle turning. Spindle top surface and cone spindle contact surface must meet at the same time on the full circumference of the spindle (see Figure 6-16).
d. Complete door closing slowly. Visually verify that all segments on the cone that can be seen are fully seated in the spindle. Slowly rotate spindle and verify that all cone segments are seated and that the segments do not seat as the spindle is rotated as evidenced by a "clicking" sound or observing the segments seating.
e. Repeat fully opening and closing door four times. Verify that after each closing all cone segments are fully closed. Verify that the load arm does not bind when door is opened and closed.
f. Secure socket lead screws (Figure 6-14) and again recheck steps "b' through "e".

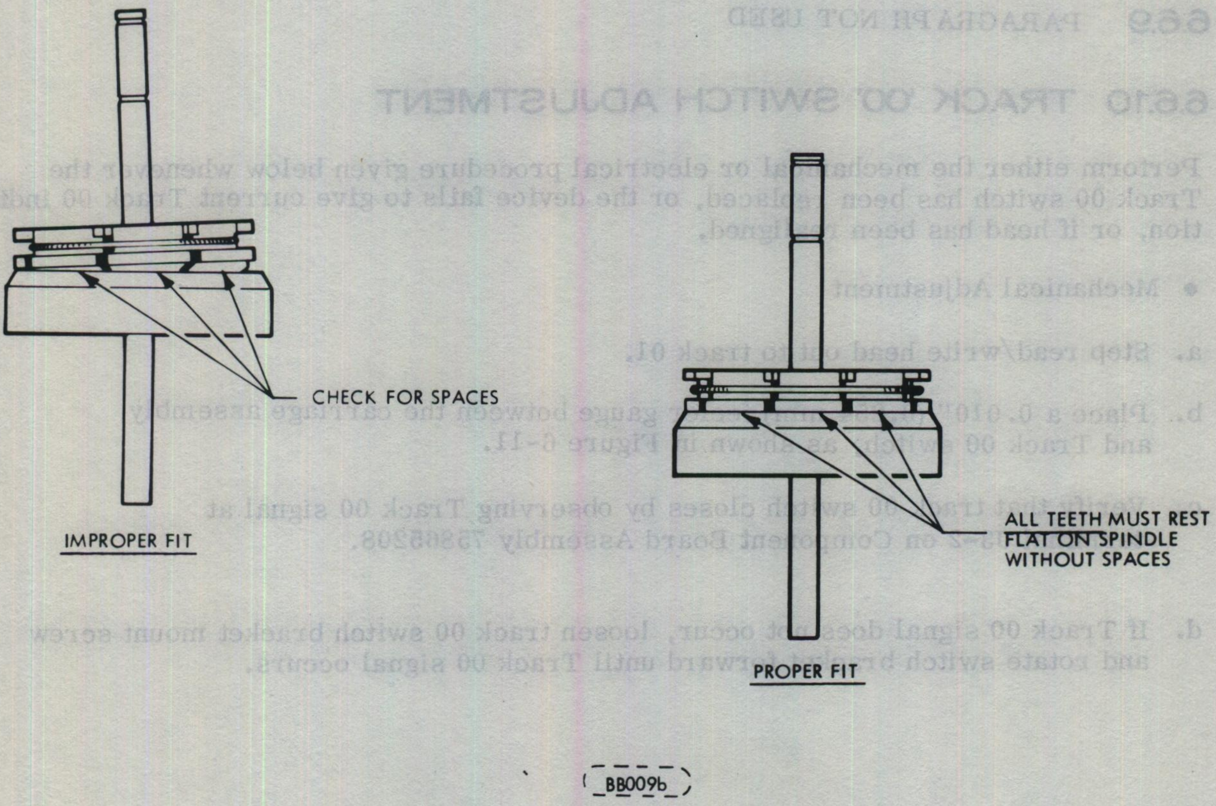


Figure 6—16. Spindle and Cone

6.6.8 WRITE PROTECT ASSEMBLY ADJUSTMENT

This adjustment will be required whenever the unit is disassembled, or a different style diskette is utilized in the unit.

a. With a Write Protected diskette installed in the unit (Write Protect slot uncovered), monitor pin J1-3 for the WRITE PROTECT signal. A continuous logically high signal will be present whenever the Write Protect assembly is properly adjusted. A logically low signal will appear if it is not properly adjusted.

b. To adjust, loosen the two hex-head screws holding the sensor mount in place. With the front panel door open, push down on the disk load arm (Figure 6-14) to insure that the disk is in the loaded position. At the same time, grasp the end of the envelope and move from side-to-side, and forward and backward while observing the WRITE PROTECT signal at pin J1-3. Adjust the mount until the WRITE PROTECT signal is present for any position of the envelope.

c. Tighten the mount screws, and re-check to verify signal under all conditions of envelope position.

6.6.9 PARAGRAPH NOT USED

6.6.10 TRACK '00' SWITCH ADJUSTMENT

Perform either the mechanical or electrical procedure given below whenever the Track 00 switch has been replaced, or the device fails to give current Track 00 indication, or if head has been realigned.

- Mechanical Adjustment

a. Step read/write head out to track 01.

b. Place a 0.010" (0.254 mm) feeler gauge between the carriage assembly and Track 00 switch, as shown in Figure 6-11.

c. Verify that track 00 switch closes by observing Track 00 signal at terminal J3-2 on Component Board Assembly 75865208.

d. If Track 00 signal does not occur, loosen track 00 switch bracket mount screw and rotate switch bracket forward until Track 00 signal occurs.

- Electrical Adjustment

e. Step the Read/Write head out to Track 00.
f. Do a continuous one-track seek (back and forth between Track 00 and 01).
g. Verify that the duty cycle of the signal observed at terminal J3-2 is 40% to 60%.
h. If Track 00 signal is not 40% to 60% duty cycle, loosen Track 00 switch bracket mount screw and rotate the switch bracket until the Track 00 signal is set to 40% to 60% duty cycle.

6.7 REMOVAL AND REPLACEMENT PROCEDURES

The following procedures give the proper sequence for removal and replacement of major assemblies. To avoid damage to parts, the procedure must be performed in sequence.

6.7.1 PRINTED CIRCUIT BOARD (PWA)

a. Disconnect the I/O Cable from J1.
b. Disconnect harness from J2, J3, J4, J5, and J6 on printed circuit board.
c. Remove the two screws from printed-circuit board adjacent to connector J1 (Figure 6-17).
d. Remove PWA by detatching it from the four push-in clips shown in Figure 6-17.
e. To replace printed circuit board push the clips through the printed circuit board.
f. Replace the two screws adjacent to connector J1.

6.7.2 ACTUATOR ASSEMBLY

a. Open front panel door.
b. Disconnect harness from J2 and J4 on printed circuit board.
c. Remove four (4) socket head screws securing chassis support (Figure 6-14).
d. Slide chassis support back far enough to clear push rod (Figure 6-14) of front panel and lift support clear of chassis.
e. Remove two (2) screws securing bearing retainer (Figure 6-10).
f. Remove stepper motor clamp by removing two socket head screws (Figure 6-10). Remove Cable Clamp.
g. Carefully slide actuator assembly (stepper motor, actuator, and bearings at the end of stepper shaft) straight out toward the rear of the FDD until unit is clear of the casting.
h. Before replacing actuator assembly, apply Lubricant (P/N 77832456) to stepper motor shaft. This should be applied sparingly whenever the carriage, carriage nut, or the stepper shaft is replaced.
i. To replace actuator assembly, slip bearings into support casting, Figure 6-10. (Assure carriage assembly is fitted on carriage guide.)

CAUTION

The wavy spring washer between the two bearings can prevent the bearings from being inserted into the support casting if the washer has slipped off-center and sticks out beyond the circumference of the bearings. If this happens, loosen the retainer screw on the end of the shaft so the bearings can separate and the washer be repositioned. The screw must be retightened after the bearings are successfully inserted.

j. Replace stepper motor clamp and two socket head screws (Figure 6-10).
k. Secure the bearing retainer by replacing the two bearing retainer screws (Figure 6-10).

CAUTION

The bearing retainer clamp should have an included angle of approximately 92° between the base and side. When base is securely fastened to chassis, this will assure proper tension on bearings. If a gap exists between bearing and retainer or if bearing is being bound up by retainer, this angle must be checked.

l. Perform Actuator Alignment Procedure, (paragraph 6.6.1).
m. Perform Spindle and Cone Adjustment, (paragraph 6.6.7).
n. Perform Push-Rod Travel Adjustment, (paragraph 6.6.4).

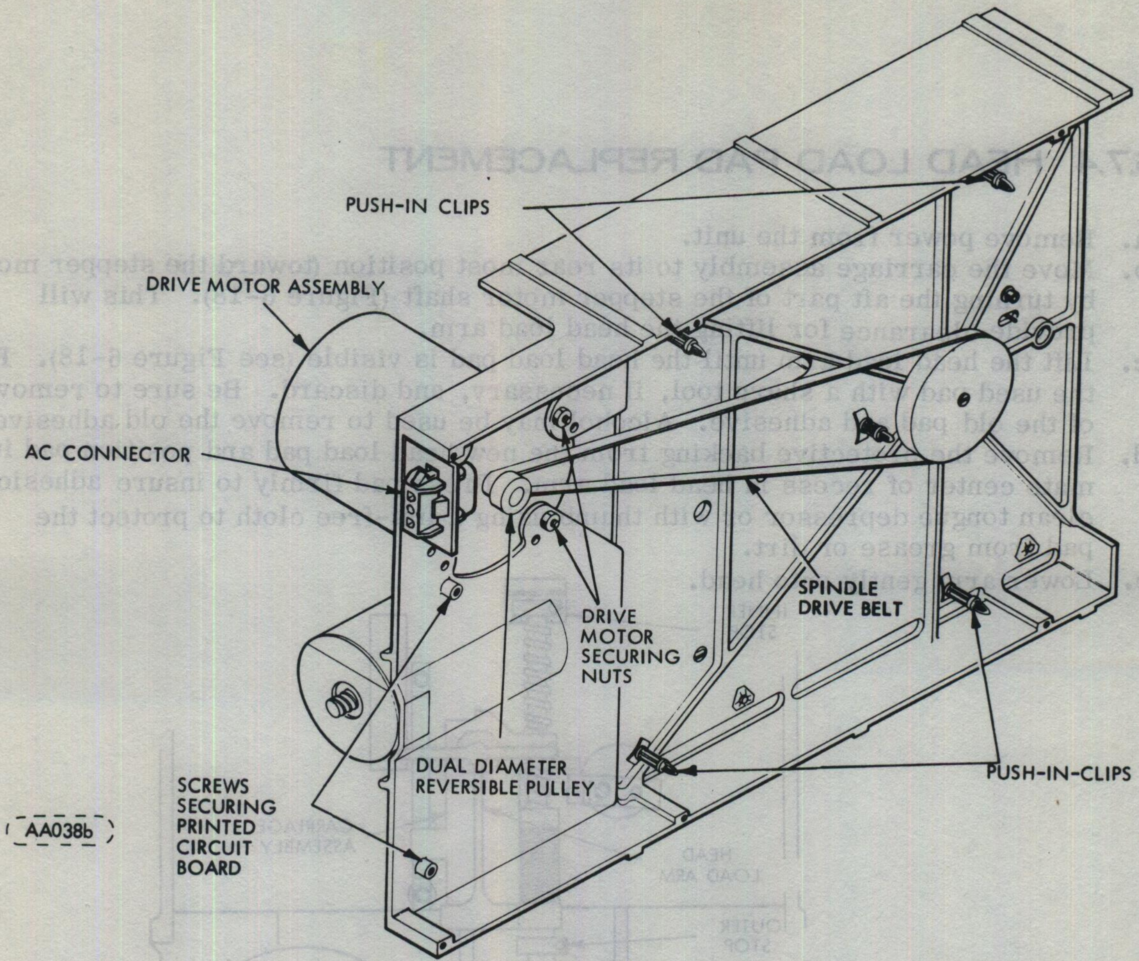

PUSH-IN CLIPS
DRIVE MOTOR ASSEMBLY
AC CONNECTOR
SPINDLE DRIVE BELT
DRIVE MOTOR SECURING NUTS
DUAL DIAMETER REVERSIBLE PULLEY
PUSH-IN-CLIPS
SCREWS SECURING PRINTED CIRCUIT BOARD
AA038b

Figure 6—17. Base Casting Assembly

6.7.3 DRIVE MOTOR ASSEMBLY

a. Perform removal procedure for printed circuit board (paragraph 6.7.1).
b. Perform removal for actuator assembly (paragraph 6.7.2)
c. Remove screws securing drive motor cable clamps.
d. Remove AC connector from bracket. (Figure 6-17)
e. Remove spindle drive belt (Figure 6-17).
f. Remove three (3) nuts securing drive motor (Figure 6-17).
g. Remove drive motor assembly (drive motor, capacitor, and AC connector).
h. To replace drive motor assembly perform, in reverse order, steps g through a substituting word replace for word remove.

6.7.4 HEAD LOAD PAD REPLACEMENT

a. Remove power from the unit.
b. Move the carriage assembly to its rear most position (toward the stepper motor) by turning the aft part of the stepper motor shaft (Figure 6-18). This will provide clearance for lifting the head load arm.
c. Lift the head load arm until the head load pad is visible (see Figure 6-18). Remove the used pad with a sharp tool, if necessary, and discard. Be sure to remove all of the old pad and adhesive. Alcohol may be used to remove the old adhesive.
d. Remove the protective backing from the new head load pad and position pad in approximate center of recess in head load arm. Press pad firmly to insure adhesion with a clean tongue depressor or with thumb using a lint-free cloth to protect the pad from grease or dirt.
e. Lower arm gently onto head.

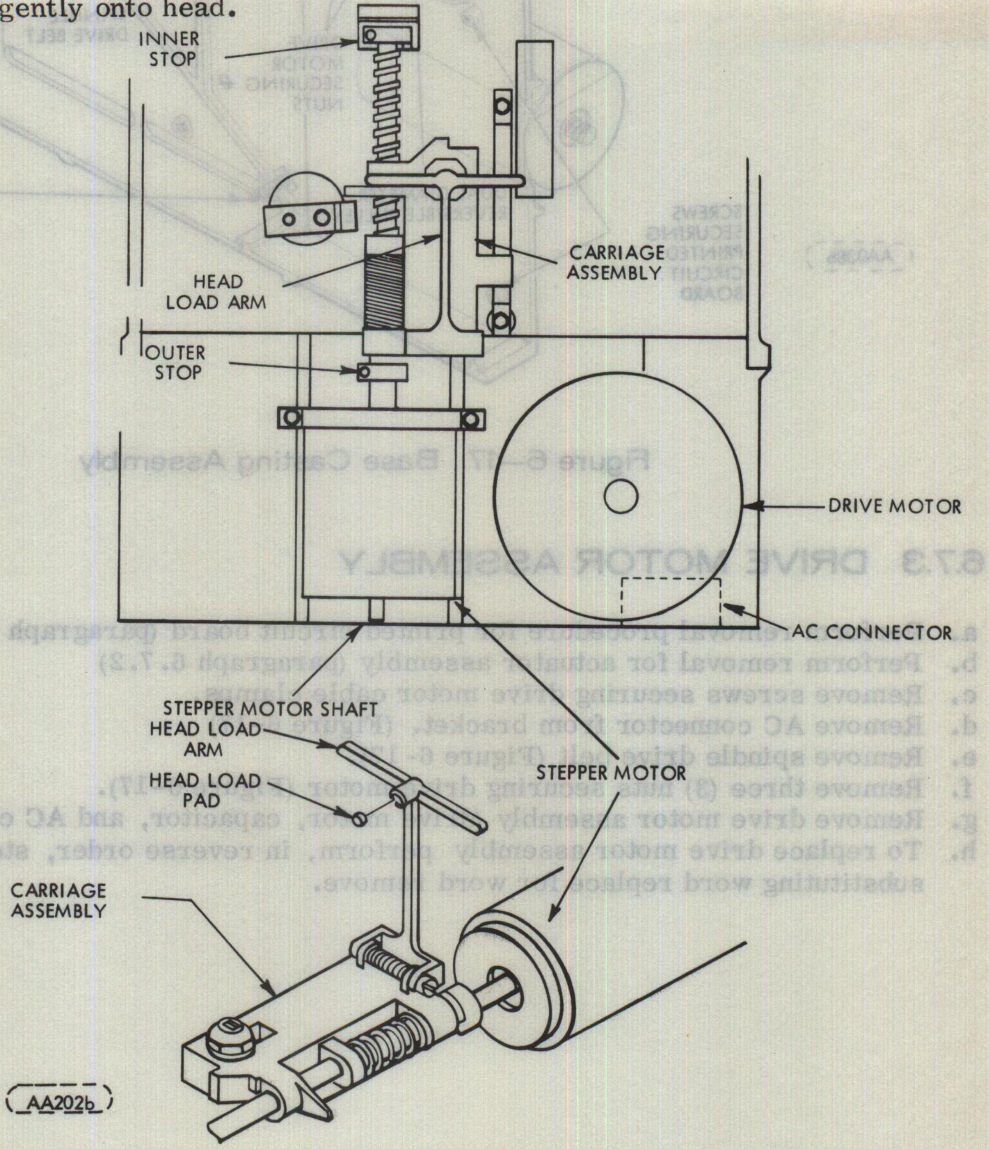


Figure 6—18. Head Load Pad Replacement Illustration

6.7.5 SOLENOID REPLACEMENT AND TAB ADJUSTMENT

This procedure must be performed whenever the solenoid is out of alignment or whenever the solenoid assembly is replaced.

a. Place the tapered end of a flat head screwdriver between tang A and solenoid clapper. (See Figure 6-15).

b. Gently bend the tang upward with the screwdriver.

c. Using a 0.060 inch (1.52 mm) wire feeler gauge, insert the feeler gauge in the gap between the underside of the clapper and the coil core. (See Figure 6-19).

d. If unable to insert 0.60 inch (1.52 mm) wire feeler gauge, continue to gently bend tang upward until feeler gauge can be inserted.

e. Next, attempt to insert a 0.062 inch (1.58 mm) wire feeler gauge between the underside of the clapper and the coil.

f. If this gauge can be inserted, bend tang down until 0.062 inch (1.58 mm) feeler gauge will not insert in gap between clapper and coil core.

g. Insert a 0.058 inch (1.47 mm) wire feeler gauge in gap between underside of clapper and coil core.

h. If 0.058 inch (1.47 mm) feeler gauge will not fit, bend tang up slightly.

i. Continue checking with the 0.062 inch (1.58 mm) wire gauge feeler and 0.058 inch (1.47 mm) wire gauge until the following condition is achieved:

   1. 0.062 inch (1.58 mm) feeler gauge will not pass between tang and clapper;

   2. 0.058 inch (1.47 mm) feeler gauge passes freely between tang and clapper.

j. Check spring adjustment by gently pressing down on clapper until the 0.060 inch (1.52 mm) ±0.002 inch (0.051 mm) gap is closed.

k. Allow clapper to rise slowly and release.

l. Clapper should be in contact with the tang.

m. If not, bend the lower tang B, Figure 6-15, downward gently.

n. Recheck that the clapper rise and perform step m until clapper and tang make contact.

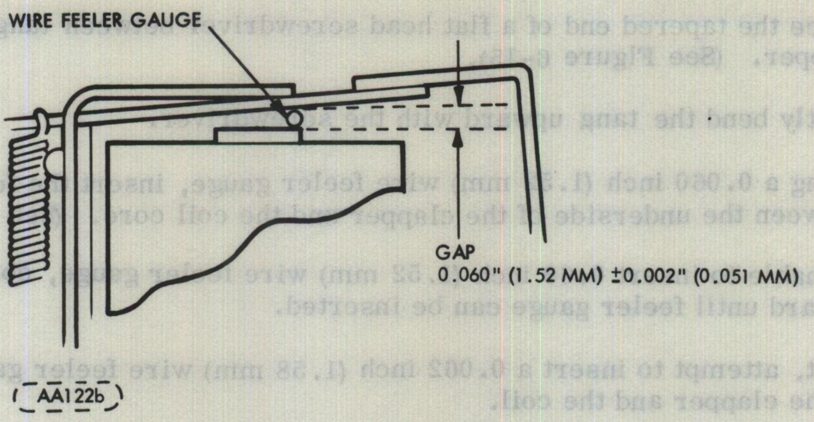


Figure 6—19. Solenoid Adjustment

6.7.6 CARRIAGE AND/OR STEPPER MOTOR REPLACEMENT

The carriage and stepper motor are to be replaced as one assembly, being factory assembled and tested only. Refer to Section 6.7.2.

6.8 FREQUENCY CONVERSION

6.8.1 OPERATING FREQUENCIES CONVERSION PROCEDURE

This procedure should be used to convert the FDD unit from 60 Hz operation to 50 Hz operation or vice versa. This is accomplished by reversing the dual diameter reversible pulley on the spindle motor shaft (Figure 6-17) using the following steps:.

a. Remove AC power.
b. Remove Printed Circuit Board Assembly per paragraph 6.7.1.
c. Remove the belt from the spindle motor pulley. (Accessible from the under side of unit.)
d. Loosen set-screw and remove pulley.
e. Reverse pulley and replace on motor shaft.
f. Position pulley allowing tolerance of 0.079" (2.01 mm) ±0.010" (0.254 mm) between shoulder of motor mounting screws and pulley (Figure 6-20).
g. Tighten down set-screw.
h. Replace belt and Printed Circuit Board.

CAUTION

It is IMPORTANT that the new operating frequency be marked on the units rating nameplate.

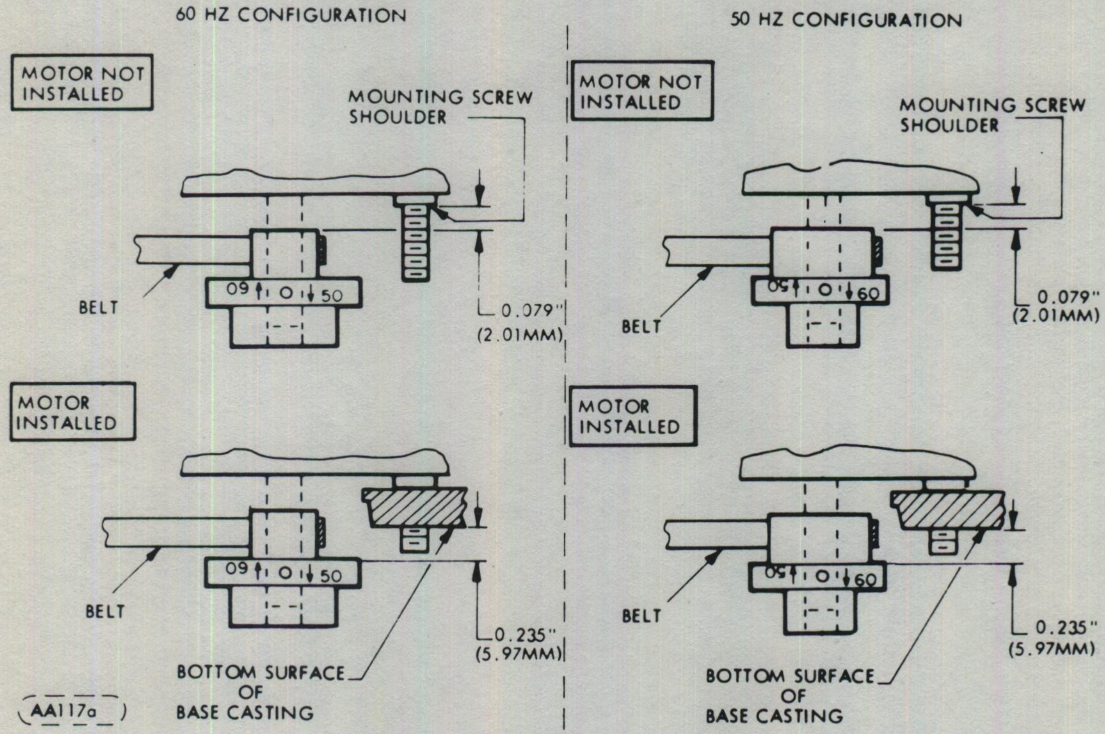


Figure 6—20. Drive Pulley Reversal

VII
MAINTENANCE AIDS

7.1 INTRODUCTION

This section contains detailed information on the logic circuits used in the FDD. The logic consists of two types of circuits: discrete component and integrated circuits (IC). Integrated circuits are contained within a single chip and discrete component circuits contain individually identifiable resistors, capacitors, transistors, etc.

7.2 PHYSICAL DESCRIPTION (LOGIC)

All components are mounted on one side of the printed circuit board. The board is 8 x 11 inches (20.32 x 27.94cm and contain both IC and discrete-component circuits.

7.3 USE OF RELATIVE LEVEL INDICATORS

The relative level indicator is a small triangle located on the input or output to a logic block. The presence or absence of this indicator indicates the conditions that are necessary to satisfy the function of the logic block. The presence of the triangle indicates a 0 logic level on that line is needed to satisfy the function. The absence of the triangle indicates a logical 1 is needed to satisfy the function.

The relative level indicator depicts the occurrence of inversion. Figure 7-1 shows some representative examples of the relative level indicator being used in this manner.

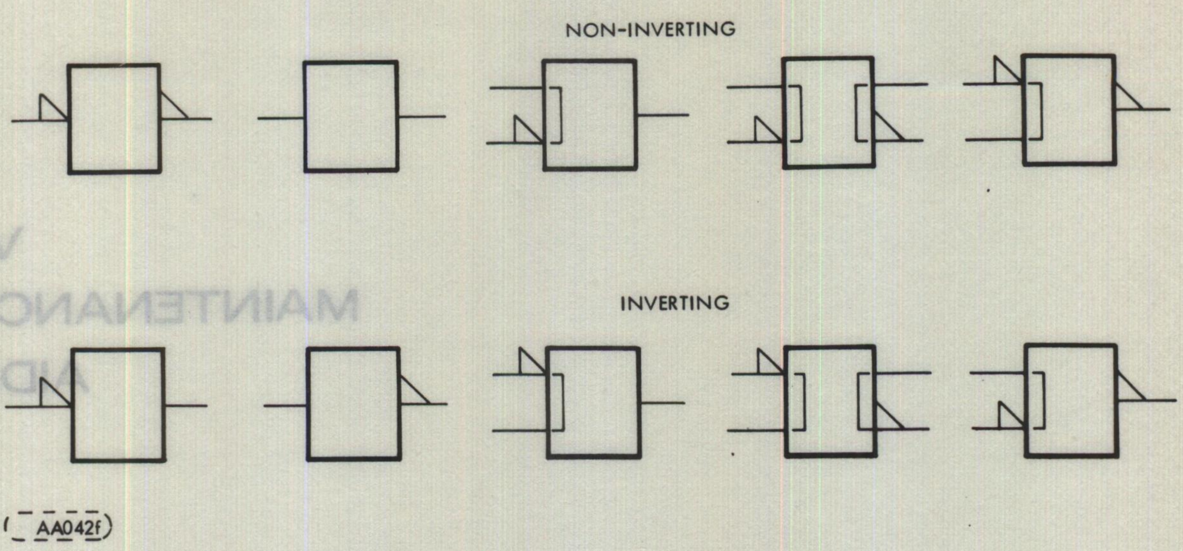


Figure 7—1. Inversion Conventions

7.4 INTEGRATED CIRCUITS

Figure 7-2 shows an example of a schematic block and the information that it contains. The first line gives the function symbol which identifies the logic function that the block performs. Refer to Figure 7-3 for a summary of function symbols. The second line gives the CDC element number. Refer to Table 7-2 for a cross reference between the CDC element number and the manufacturers type. The third line on the schematic block gives the circuit reference designation.

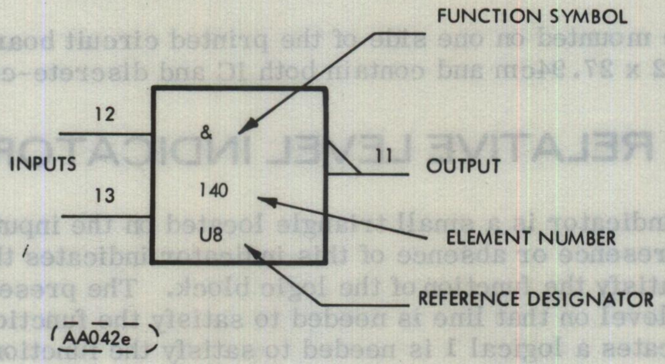


Figure 7—2. Integrated Circuit

Table 7–1. CDC Element Number Cross Reference

CDC DESIGNATION		MANUFACTURING DESIGNATION	
ELEMENT	PART NO.	TYPE	FUNCTION
140	88924400	7400	QUAD 2-INPUT NAND
141	88898200	7410	TRIPLE 3-INPUT NAND
143	66299102	7440	DUAL 4-INPUT BUFFER
160	50251000	7472	J/K MS FLIP-FLOP
161	15158400	9601	RETRIGGERABLE MULTIVIBRATOR
172H	50251600	3002	QUAD 2-INPUT NOR
175	96744156	7474	DUAL TYPE D FLIP-FLOP
180	51768201	75450	DUAL PERIPHERAL DRIVER
200	96744155	7406	HEX INVERTER
302	15126900	733	OPERATIONAL AMPLIFIER
902	50254500	75154	QUAD RECEIVER
8T20	15127000	8T20	BIDIRECTIONAL ONE-SHOT

BB024b

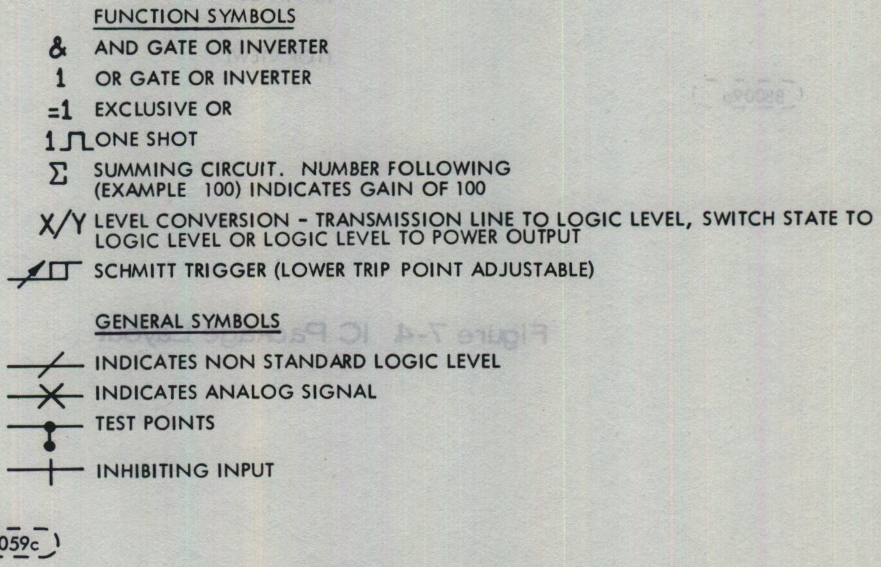

FUNCTION SYMBOLS
& AND GATE OR INVERTER
1 OR GATE OR INVERTER
=1 EXCLUSIVE OR
1⎍ ONE SHOT
Σ SUMMING CIRCUIT. NUMBER FOLLOWING (EXAMPLE 100) INDICATES GAIN OF 100
X/Y LEVEL CONVERSION - TRANSMISSION LINE TO LOGIC LEVEL, SWITCH STATE TO LOGIC LEVEL OR LOGIC LEVEL TO POWER OUTPUT
SCHMITT TRIGGER (LOWER TRIP POINT ADJUSTABLE)
GENERAL SYMBOLS
INDICATES NON STANDARD LOGIC LEVEL
INDICATES ANALOG SIGNAL
TEST POINTS
INHIBITING INPUT
AA059c

Figure 7–3. Schematic Symbols

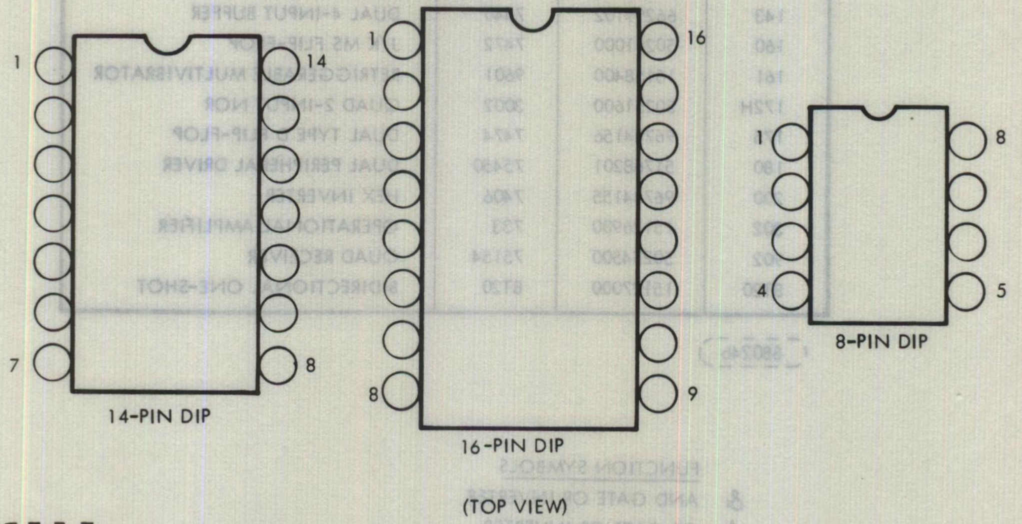


Figure 7-4. IC Package Layout

8.1 INTRODUCTION

This section contains an illustrated parts breakdown that describes and illustrates all variations of the Flexible Disk Drive (FDD). In general, parts are in disassembly sequence but do not necessarily indicate the maximum recommended disassembly of parts in the field.

8.2 ILLUSTRATIONS

Item numbers within a circle ① indicate an assembly (group of parts). Item numbers without a circle, 1, indicate a single part; a group of parts that are pinned or press fitted together; or a group of parts which is normally replaced as an assembly.

8.3 PARTS LISTS

In addition to the accompaning parts list on each illustration, two additional Parts Lists are available; the Top-Down Assembly/Component Parts List and the Cross Reference Index. Instruction for the use of all Parts lists in paragraph 8.6.

8.4 TOP MECHANICAL AND ASSEMBLY LOCATOR

In conjunction with Table 8-1, Figure 8-1 serves two purposes;

1. When used in Table 8-1, it identifies all unique parts and assemblies for each FDD variation.
2. It identifies by sheet location where all major assemblies are broken down.

8.4.1 TOP MECHANICAL ASSEMBLY (TMA)

To determine what parts are used on a particular model, find the applicable model in Table 8-1. The corresponding item number represents the last three digits of the TMA number. Example: Model BR803N, TMA number 75744013. The item numbers at the top of Table 8-1 corresponds with the item numbers in Figure 8-1. All parts and assemblies that apply will be identified with an 'X' ('0' means not applicable).

8.5 REPLACEMENT PARTS

When ordering replacement parts for the FDD, the inclusion of the Model designation and the figure, item and part identification numbers for each part ordered will ensure positive identification of parts.

NOTE

Replacement parts for all OEM engineering evaluation units (BRXXXX TMA099) must be obtained from MPI OEM Engineering.

Table 8-1. Top Mechanical Assembly Configurator

```
           I -----------------------ITEM NUMBERS------------------------------------------------
         T T 1111111111 1111111111 1111111111 1111111111 1111111111 1111111111 1111111111
MODELS   M E 0000000001 1111111112 2222222223 3333333334 4444444445 5555555556 6666666667
         A M 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
-----------------------------------------------------------------------------------------

BR803A 001 XX00000000 0000000000 0X000X0000 0X0000X000 XX0X0XX00X 0000X00000 0000000000
BR803B 002 X0X0000000 0000000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR803C 003 X00X000000 0000000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR803D 004 X000X00000 0000000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR803E 005 X000000000 X000000000 0X000X0000 00X000X000 XX0X0XX00X 0000X00000 0000000000
BR803F 006 X00000X000 0000000000 0X000X0000 00X000X000 XX0X00X00X 0000X00000 0000000000
BR803G 007 X000000000 X000000000 0X000X0000 000X00X000 XX0X0XX00X 0000X00000 0000000000
BR803H 008 X0X0000000 0000000000 0X000X0000 000X00X000 XX0X00X00X 0000X00000 0000000000
BR805A 009 XX00000000 0000000000 0X00XX0000 0000X0X000 XX0X0XXX0X 0000X00000 0000000000
BR805B 010 X0X0000000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR805C 011 X00X000000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR805D 012 X000X00000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR803N 013 XX00000000 0000000000 0X00XX0000 0000X0X000 XX0X0XXX0X 0000X00000 0000000000
BR803P 014 X0X0000000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR803R 015 X000X00000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR803S 016 X00X000000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR803J 017 X000000000 0000X00000 0X000X0000 00X000X000 XX0X00X00X 0000X00000 0000000000
BR803K 018 X000000000 0000X00000 0X000X0000 000X00X000 XX0X00X00X 0000X00000 0000000000
BR803L 019 X000000000 0000000000 0X000X000X 00000XX000 XX0000X00X 0000X00000 0000000000
BR803M 020 X000000000 0000000000 0X000X00X0 00000XX000 XX000XX00X 0000X00000 0000000000
BR8A3C 021 X000000X00 0000000000 0X000X0000 00X000X000 XX0X00X00X 0000X00000 0000000000
BR8A3D 022 X0000000X0 0000000000 0X000X0000 00X000X000 XX0X0XX00X 0000X00000 0000000000
BR8A3E 023 X000000X00 0000000000 0X000X0000 000X00X000 XX0X00X00X 0000X00000 0000000000
BR8A3F 024 X0000000X0 0000000000 0X000X0000 000X00X000 XX0X0XX00X 0000X00000 0000000000
BR8A2A 025 XX00000000 0000000000 0X00XX0000 0X00000000 XX0X0XX00X 0000X00000 0000X00000
BR803T 026 X0000X0000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR805E 027 X0000X0000 0000000000 0X00XX0000 0000X0X000 XX0X00XX0X 0000X00000 0000000000
BR8A3A 028 X000000000 X000000000 0X000X0000 0X0000X000 XX0X0XX00X 0000X00000 0000000000
BR8A3B 029 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000
BR8A2B 030 X0X0000000 0000000000 0X00XX0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2C 031 X00X000000 0000000000 0X00XX0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2D 032 X0000X0000 0000000000 0X00XX0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2E 033 X000X00000 0000000000 0X00XX0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2F 034 X000000000 00X0000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR8A2G 035 XX00000000 0000000000 0X00XX0000 0000000000 XX0X0XX00X 0000X00000 0000X0000X
BR8A2H 036 X000000000 0000000000 0X0X0X0000 0X0000X000 XX00X0X00X 0000X00000 0000000000
BR8A2J 037 XX00000000 0000000000 0X000X0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2K 038 X00X000000 0000000000 0X000X0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2L 039 X00X000000 0000000000 0X000X0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2M 040 X0000X0000 0000000000 0X000X0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2N 041 X000X00000 0000000000 0X000X0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2P 042 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000
BR8A2R 043 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000
BR8A4A 044 X000000000 0000000000 0X000XXX00 X000000X0X 00X00X00X0 0X00XXXX0X 000X000X00
BR8A4B 045 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000
BR8A7A 046 X00000000X 0000000000 0X000X0000 X000000X0X 00XX0X00X0 0X00X0000X 000X000X00
BR8A5A 047 X0000000X0 0000000000 0X00XX0000 0000000000 XX0X00X00X 0000X00000 XX00X00000
BR8A5B 048 X000000X00 0000000000 0X00XX0000 0000000000 XX0X00X00X 0000X00000 XX00X00000
BR8A2W 049 X00000X000 0000000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR8A2Y 050 X000000000 00X0000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR8A6B 051 X0X0000000 0000000000 0X000X0000 0X0000X000 XX0X00X00X 0000X00000 0000000000
BR803U 052 X000000000 X000000000 0X000X0000 0X0000X000 XX0X0XX00X 0000X00000 0000000000
BR8A2S 053 X000000000 0000000000 0X00XX0000 0X000000X0 XX0X00X00X 0000X00000 0000X00000
BR8A2T 054 X000000X00 0000000000 0X00XX0000 0X00000000 XX0X00X00X 0000X00000 0000X00000
BR8A2U 055 X000000000 X000000000 0X000X0000 00X000X000 XX0X0XX00X 0000X00000 0000000000
BR8A2Y 056 X000000000 00X0000000 0X00XX0000 0X00000000 XX0X0XX00X 0000X00000 0000X00000
BR8A2Z 057 X0000000X0 0000000000 0X000X0000 0X00000000 XX0X0XX00X 0000X00000 0000X00000
BR8A3G 058 XX00000000 0000000000 0X00XX0000 0X00000000 XX0X0XX00X 0000X00000 0000X00000
BR8A3H 059 X0X0000000 0000000000 0X00XX0000 0X00000000 XX0X0XX00X 0000X00000 0000X00000
BRXXXX 099 OEM ENGINEERING UNIT
```

ITEM	IDENT NO	DESCRIPTION	WHERE USED
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA
102	75291920-9	DRIVE MOTOR ASM	TMA
103	75291923-3	DRIVE MOTOR ASM	TMA
104	75291926-6	DRIVE MOTOR ASM	TMA
105	75291927-4	DRIVE MOTOR ASM	TMA
106	75291928-2	DRIVE MOTOR ASM	TMA
107	75291925-8	DRIVE MOTOR ASM	TMA
108	75747904-3	DRIVE MOTOR ASM	TMA
109	75747903-5	DRIVE MOTOR ASM	TMA
110	75747905-0	DRIVE MOTOR ASM	TMA
111	75291921-7	DRIVE MOTOR ASM	TMA
113	75291924-1	DRIVE MOTOR ASM	TMA
114	75747909-2	DRIVE MOTOR ASSY	TMA
122	94277416-7	STRAP, CABLE TIE	TMA
124	75291902-7	DRIVE MOTOR ASM	TMA
125	83427801-2	WRITE PROTECT ASM	TMA
126	92602001-7	CLAMP	TMA
127	77830690-2	DISKETTE DETECT ASM	TMA
128	77830680-3	DRIVE MOTOR ASM	TMA
129	77834213-9	DRIVE MOTOR ASM	TMA
130	77834214-7	DRIVE MOTOR ASM	TMA
131	83401806-1	FRONT PANEL ASM	TMA
132	83401801-2	FRONT PANEL ASM	TMA
133	83401802-0	FRONT PANEL ASM	TMA
134	83401803-8	FRONT PANEL ASM	TMA
135	83401804-6	FRONT PANEL ASM	TMA
136	83401805-3	FRONT PANEL ASM	TMA
137	75791506-1	ACTUATOR ASM	TMA
138	75791507-9	ACTUATOR ASM	TMA
139	75747917-5	DRIVE MOTOR ASM	TMA
140	77830685-2	UPPER HARNESS ASM	TMA
141	75747301-2	UPPER HARNESS ASM	TMA
142	83403502-4	LOWER HARNES ASM	TMA
143	83403503-2	LOWER HARNESS ASM	TMA
144	83403700-4	CONNECTOR BRACKET	TMA
145	75272300-7	CONNECTOR BRACKET	TMA
146	77830538-3	CSA LABEL	TMA
147	77594901-9	TRACK SWITCH ASM	TMA
148	83460101-5	AMP CONN KIT	TMA
149	75746702-4	CAPACITOR BRACKET	TMA
150	72959302-0	LABEL	TMA
152	77832691-8	MOUNTING KIT	TMA
155	93592240-1	SCREW-WASHER	TMA
156	77830641-5	AC CONN & RELAY ASM	TMA
157	77830995-5	COVER	TMA
158	17901508-6	SCREW	TMA
160	77834336-8	LABEL, FCO	TMA
161	77834543-9	FRONT PANEL ASSY	TMA
162	75746701-4	CAPACITOR BRACKET	TMA
164	77836055-2	LABEL	TMA
165	75791508-7	ACTUATOR ASSY	TMA
168	77594704-7	OPT TRACK SENSE ASSY	TMA
170	83401808-7	FRONT PANEL ASSY	TMA
336	93592160-1	SCREW, SELF TAP	TMA

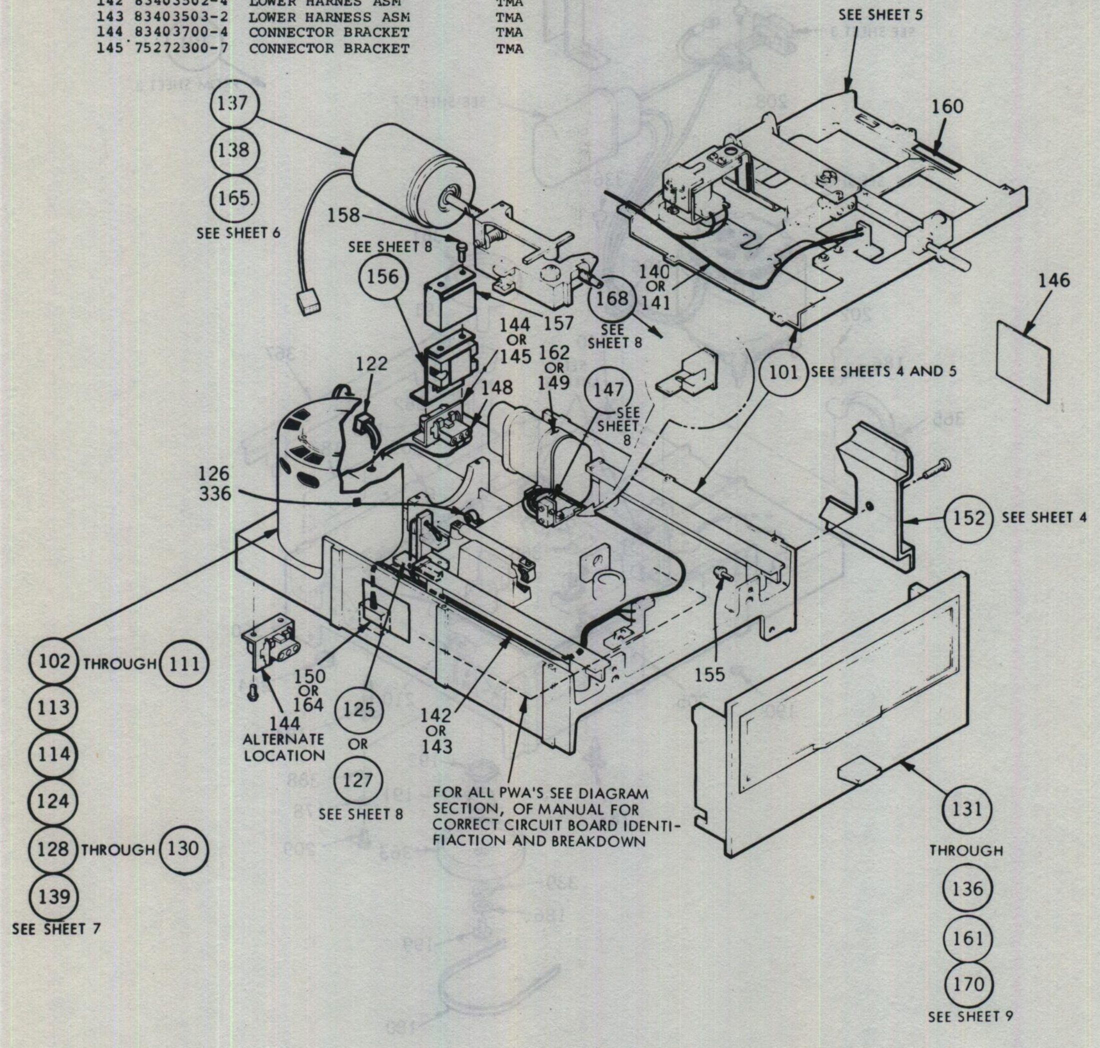


Figure 8-1. Top Mechanical Assembly

ITEM	IDENT NO	DESCRIPTION	WHERE USED
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA
152	77832691-8	MOUNTING KIT	TMA
178	10125801-0	WASHERS SPR LOCK	101
180	75293203-8	BELT-FLAT	101
183	75774732-4	CLIP-PUSH IN	101
184	75774736-5	CLIP-PUSH IN	101
186	10125803-6	WASHERS SPR LOCK	101
187	77832145-5	IDENT RATING UP	101
188	77832145-5	LABEL IDENT	101
190	94217702-3	NUT-SELF LOCK, STL 8	101
191	92073022-3	BEARING FLANGED	101
192	93529005-6	WASHER-SPRING WAVE	101
196	16402506-6	CLAMP CABLE	101
199	09000403-7	SCREW BIND HEAD	101
202	10126222-8	SCREW HEX SOC HD	101
204	77832438-4	NUT, SELFTHD	101
205	93592086-8	SCR HEX SELF TAP	101
208	92602003-3	CLAMP, CABLE-NYLON	101
209	10126214-5	SCR HEX SOC HD CAP	101
210	83427900-2	PLATE-NUT	101
255	10127131-0	SCREW	152
256	10125805-1	LOCK WASHER	152
301	77830975-7	ADAPTER	152
336	93592160-1	SCREW, SELF TAP	101
339	10126401-8	STAR LOCK WASHER	101
340	75731302-8	ELECTRICAL SYMBOL	101
342	77594800-3	DECAL	152
360	75791700-0	BASE-MECHANISM, DIE	101
361	83403601-4	SPINDLE	101
362	75747000-0	SPACER BEARING	101
363	75745200-8	PULLEY-SPINDLE	101
365	83461800-1	CLAMP, STEPPER MOTOR	101
366	75292400-1	GUIDE-CARRIAGE	101
367	83401700-6	RAIL-DISK INJEC MOLD	101
377	93592486-0	SCREW	101
388	10125603-0	WASHER	101

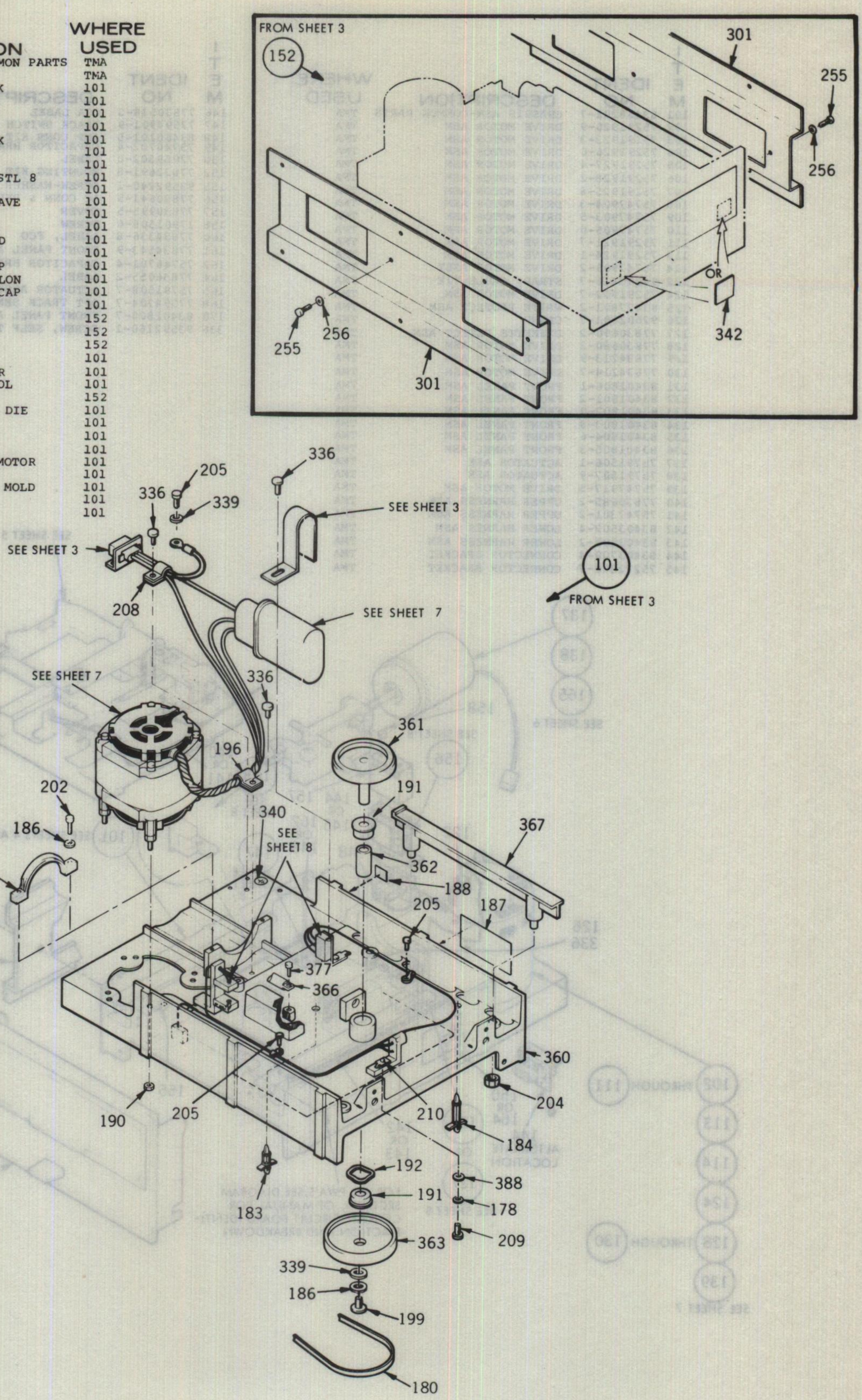
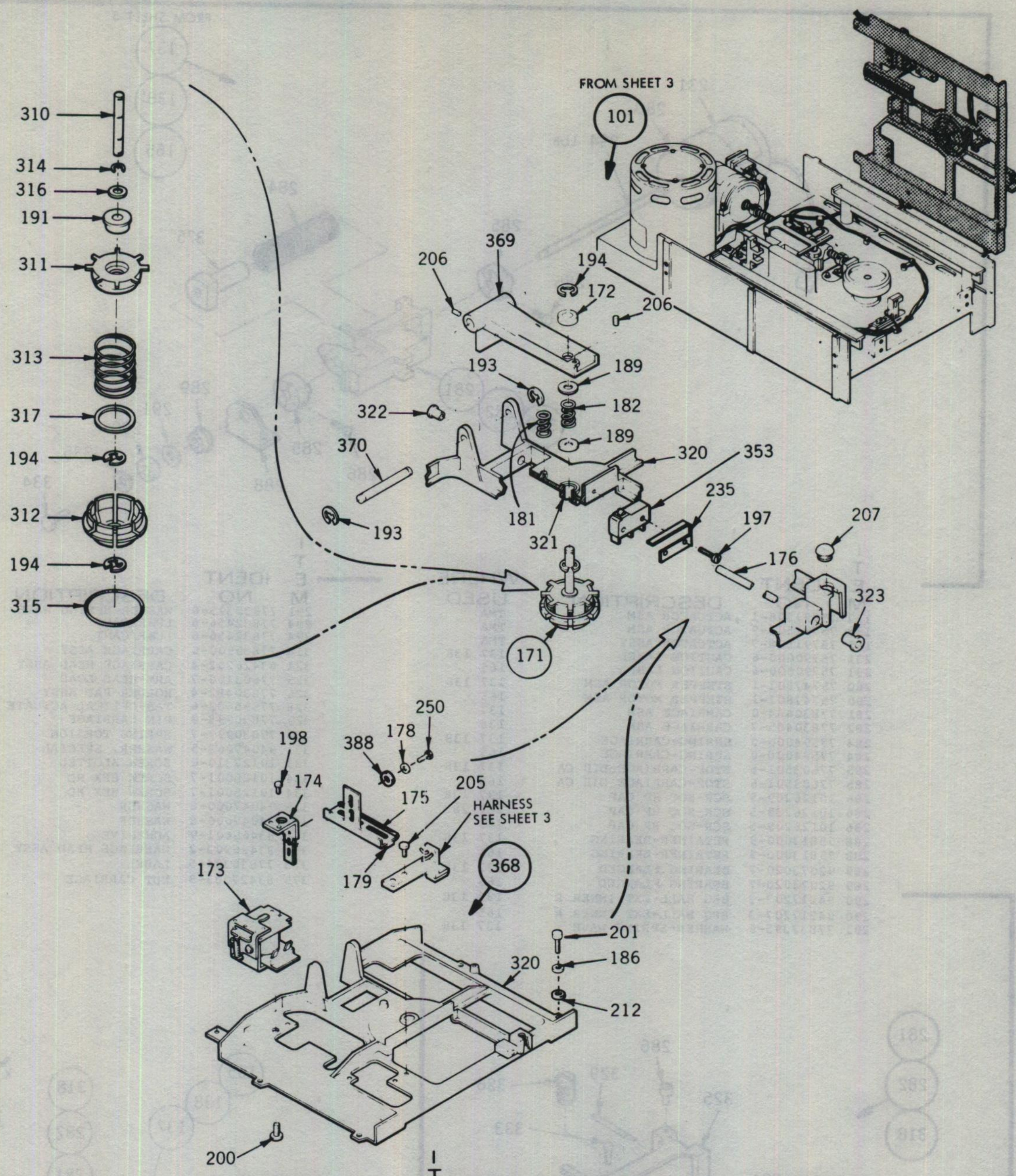


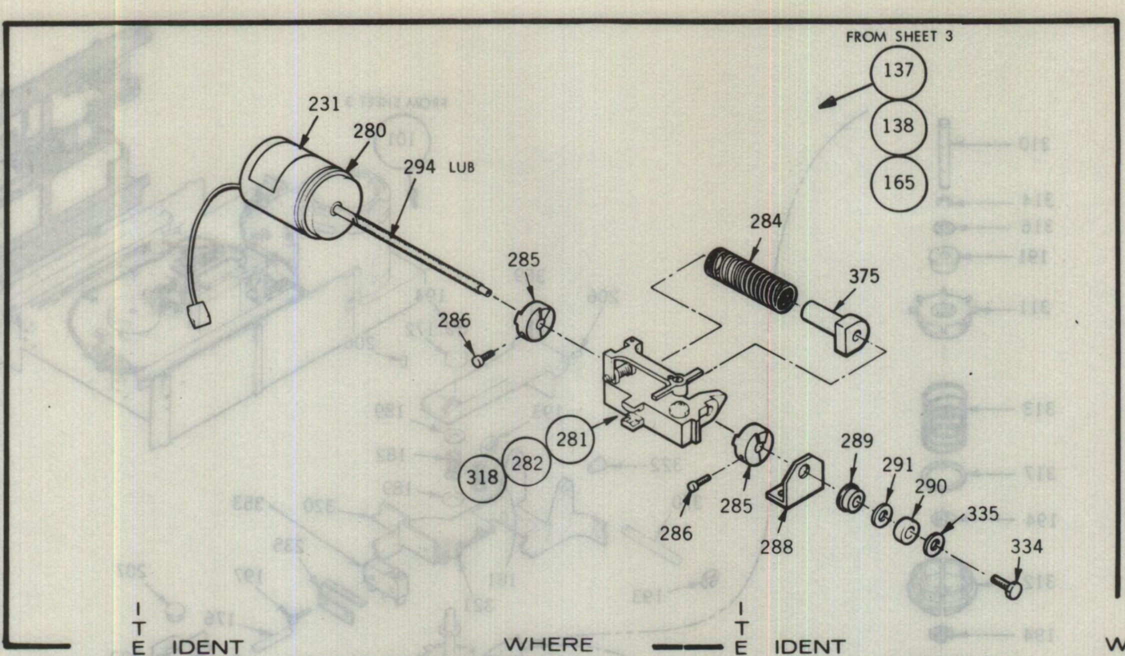
Figure 8-2. FDD Common Parts (Sheet 1 of 2)



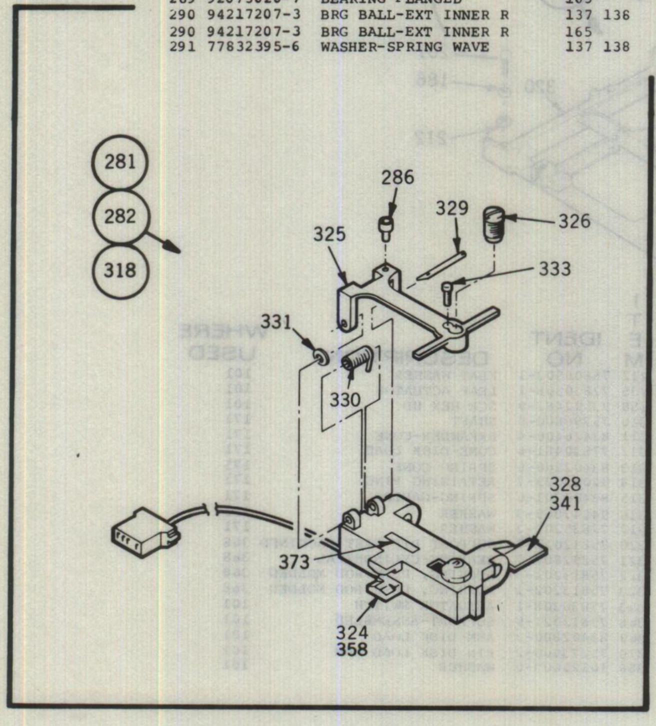
ITEM	IDENT NO	DESCRIPTION	WHERE USED
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA
171	83402101-6	CONE ASM	101
172	75273200-8	BUSHING	101
173	75747202-2	SOLENOID	101
174	77834331-9	EXTENSION ARMATURE	101
175	77834326-9	BAIL ARMATURE	101
176	75885163-8	PUSH ROD ASSY	101
178	10125801-0	WASHERS SPR LOCK	101
179	77830732-2	FOAM PAD	101
181	75292609-7	SPRING-COMPRESSION	101
182	75292611-3	SPRING-COMPRESSION	101
186	10125803-6	WASHERS SPR LOCK	101
189	77835200-5	WASHER, NYLON	101
191	92073022-3	BEARING FLANGED	171
193	92033037-0	RING RETAINING	101
194	92033038-8	RETAINING RING	101 171
197	09000005-0	SCREW BIND HEAD	101
198	09000202-3	SCREW BIND HEAD	101
200	09000504-2	SCREW BIND HEAD	101
201	10126219-4	SCR HEX SOC HD CAP	101
205	93592086-8	SCR HEX SELF TAP	101
206	83413408-2	SCREW-SELF LOCKING	101
207	83411202-1	BUMPER DOOR	101

ITEM	IDENT NO	DESCRIPTION	WHERE USED
212	75806503-1	FLAT WASHER	101
235	77830308-1	LEAF ACTUATOR	101
250	93592482-9	SCR HEX HD	101
310	75790800-9	SHAFT	171
311	83426400-4	EXPANDER-CONE	171
312	77830481-6	CONE-DISK LOAD	171
313	83402200-6	SPRING CONE	171
314	92033029-7	RETAINING RING	171
315	83409701-6	SPRING-GARTER	171
316	94047069-3	WASHER	171
317	77835201-3	WASHER	171
320	75812011-7	SUPPORT DIE CAST MACHINED	368
321	75292807-7	BEARING-CYLINDRICAL	368
322	75813201-3	BUSHING, PUSH ROD MOLDED	368
323	75813202-1	BUSHING, PUSH ROD MOLDED	368
353	77830308-1	ACTUATOR SWITCH	101
368	75812021-6	SUPPORT-ASSEMBLED	101
369	83402800-3	ARM-DISK LOAD	101
370	75273000-2	PIN DISK LOAD ARM	101
388	10125603-0	WASHER	101

Figure 8-2. FDD Common Parts (Sheet 2 of 2)



ITEM	IDENT NO	DESCRIPTION	WHERE USED
137	75791506-1	ACTUATOR ASM	TMA
138	75791507-9	ACTUATOR ASM	TMA
165	75791508-7	ACTUATOR ASSY	TMA
231	75790000-6	CAUTION LABEL	137 138
231	75790000-6	CAUTION LABEL	165
280	75747801-1	STEPPER MOTOR ASM	137 138
280	75747801-1	STEPPER MOTOR ASM	165
281	77830484-0	CARRIAGE ASM	137
282	77830485-7	CARRIAGE ASM	138
284	77594000-0	SPRING-CARRIAGE	137 138
284	77594000-0	SPRING-CARRIAGE	165
285	77603501-6	STOP-CARRIAGE DIE CA	137 138
285	77603501-6	STOP-CARRIAGE DIE CA	165
286	10126209-5	SCR-SOC HP CAP	137 138
286	10126209-5	SCR-SOC HP CAP	281 282
286	10126209-5	SCR-SOC HP CAP	165
288	75813000-9	RETAINER-BEARING	137 138
288	75813000-9	RETAINER-BEARING	165
289	92073020-7	BEARING FLANGED	137 138
289	92073020-7	BEARING FLANGED	165
290	94217207-3	BRG BALL-EXT INNER R	137 138
290	94217207-3	BRG BALL-EXT INNER R	165
291	77832395-6	WASHER-SPRING WAVE	137 138
291	77832395-6	WASHER-SPRING WAVE	165
294	77832456-6	LUBRICANT	137 138
294	77832456-6	LUBRICANT	165
318	77839900-6	CARRIAGE ASSY	165
324	83426202-4	CARRIAGE HEAD ASSY	281 282
325	77603100-7	ARM-HEAD LOAD	281 282
326	77830482-4	HOLDER-PAD ASSY	281 282
328	77595600-6	TAB-OPTICAL ACTUATE	282
329	77830998-9	PIN CARRIAGE	281 282
330	77830999-7	SPRING TORSION	281 282
331	94047068-5	WASHER, SPECIAL	282
333	10127310-0	SCREW SLOTTED	281 282
334	10125001-7	SCREW HEX HD	137 138
334	10125001-7	SCREW HEX HD	165
335	94047000-8	WASHER	137 138
335	94047000-8	WASHER	165
341	83465601-9	ADHESIVE	282
358	83426203-2	CARRIAGE HEAD ASSY	318
373	77635304-5	LABEL	324 358
375	83427303-9	NUT CARRIAGE	165



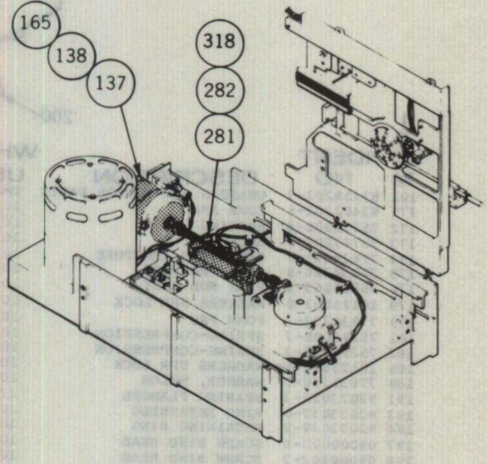
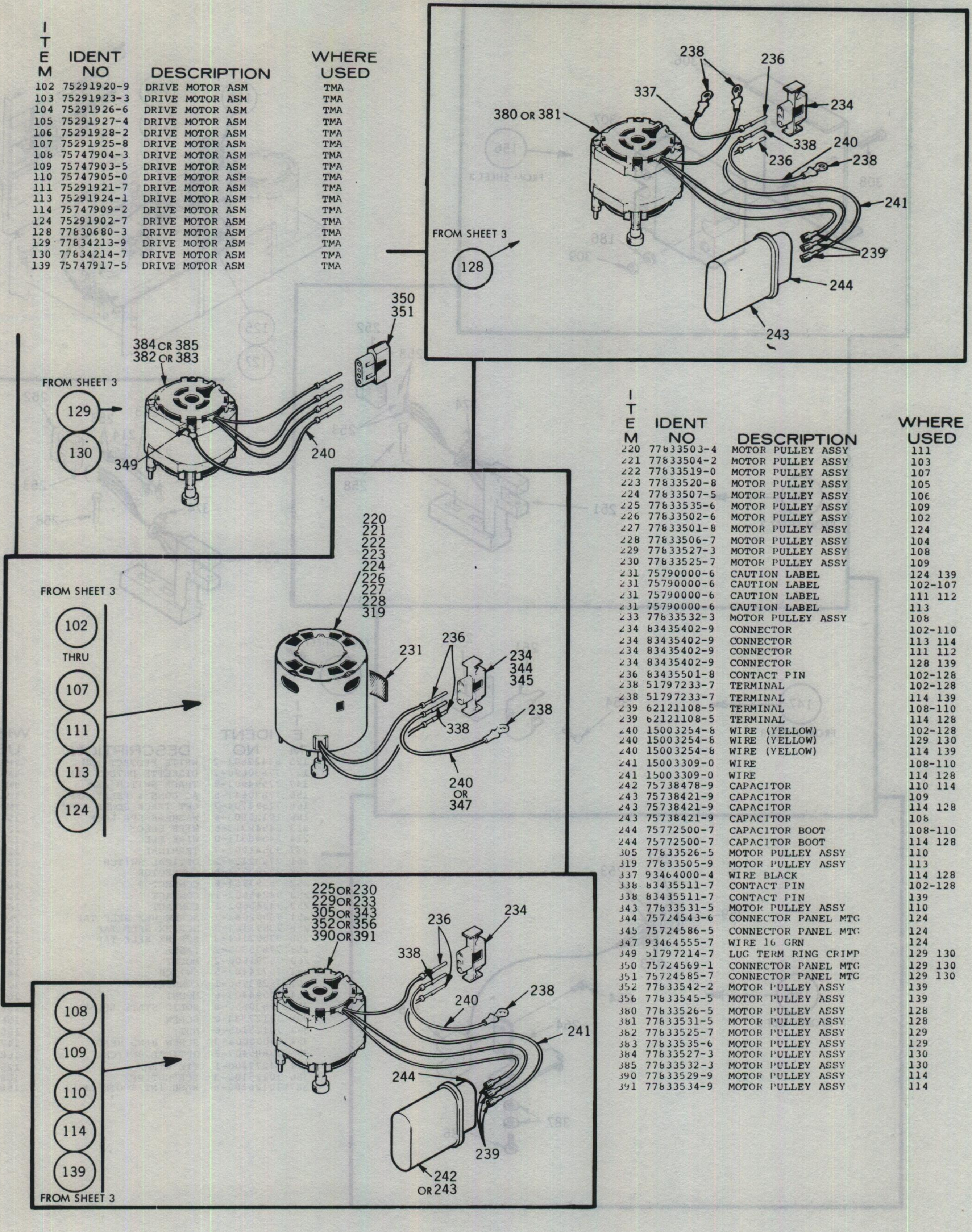


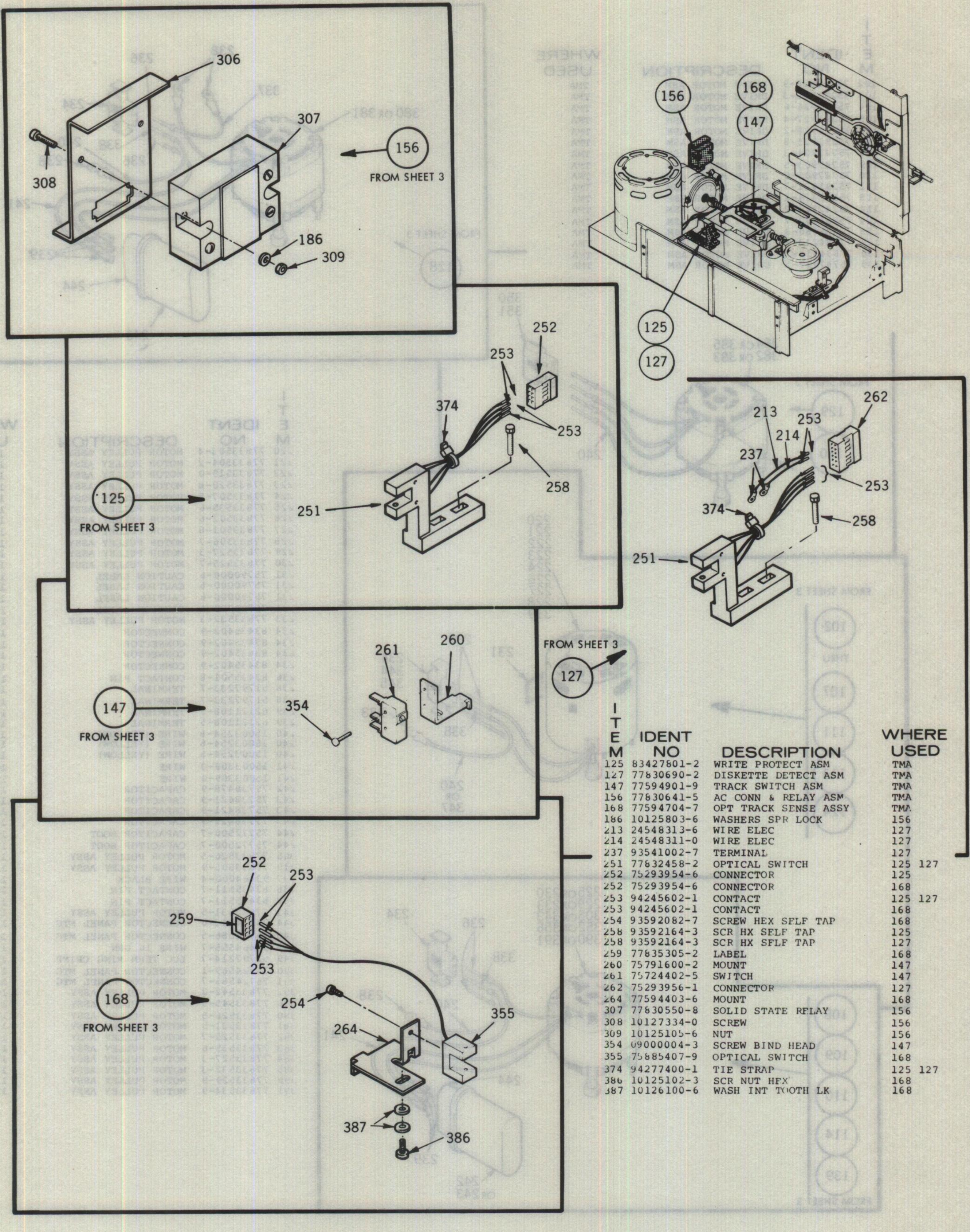
Figure 8-3. Actuator and Carriage Assemblies

ITEM	IDENT NO	DESCRIPTION	WHERE USED
102	75291920-9	DRIVE MOTOR ASM	TMA
103	75291923-3	DRIVE MOTOR ASM	TMA
104	75291926-6	DRIVE MOTOR ASM	TMA
105	75291927-4	DRIVE MOTOR ASM	TMA
106	75291928-2	DRIVE MOTOR ASM	TMA
107	75291925-8	DRIVE MOTOR ASM	TMA
108	75747904-3	DRIVE MOTOR ASM	TMA
109	75747903-5	DRIVE MOTOR ASM	TMA
110	75747905-0	DRIVE MOTOR ASM	TMA
111	75291921-7	DRIVE MOTOR ASM	TMA
113	75291924-1	DRIVE MOTOR ASM	TMA
114	75747909-2	DRIVE MOTOR ASM	TMA
124	75291902-7	DRIVE MOTOR ASM	TMA
128	77830680-3	DRIVE MOTOR ASM	TMA
129	77834213-9	DRIVE MOTOR ASM	TMA
130	77834214-7	DRIVE MOTOR ASM	TMA
139	75747917-5	DRIVE MOTOR ASM	TMA



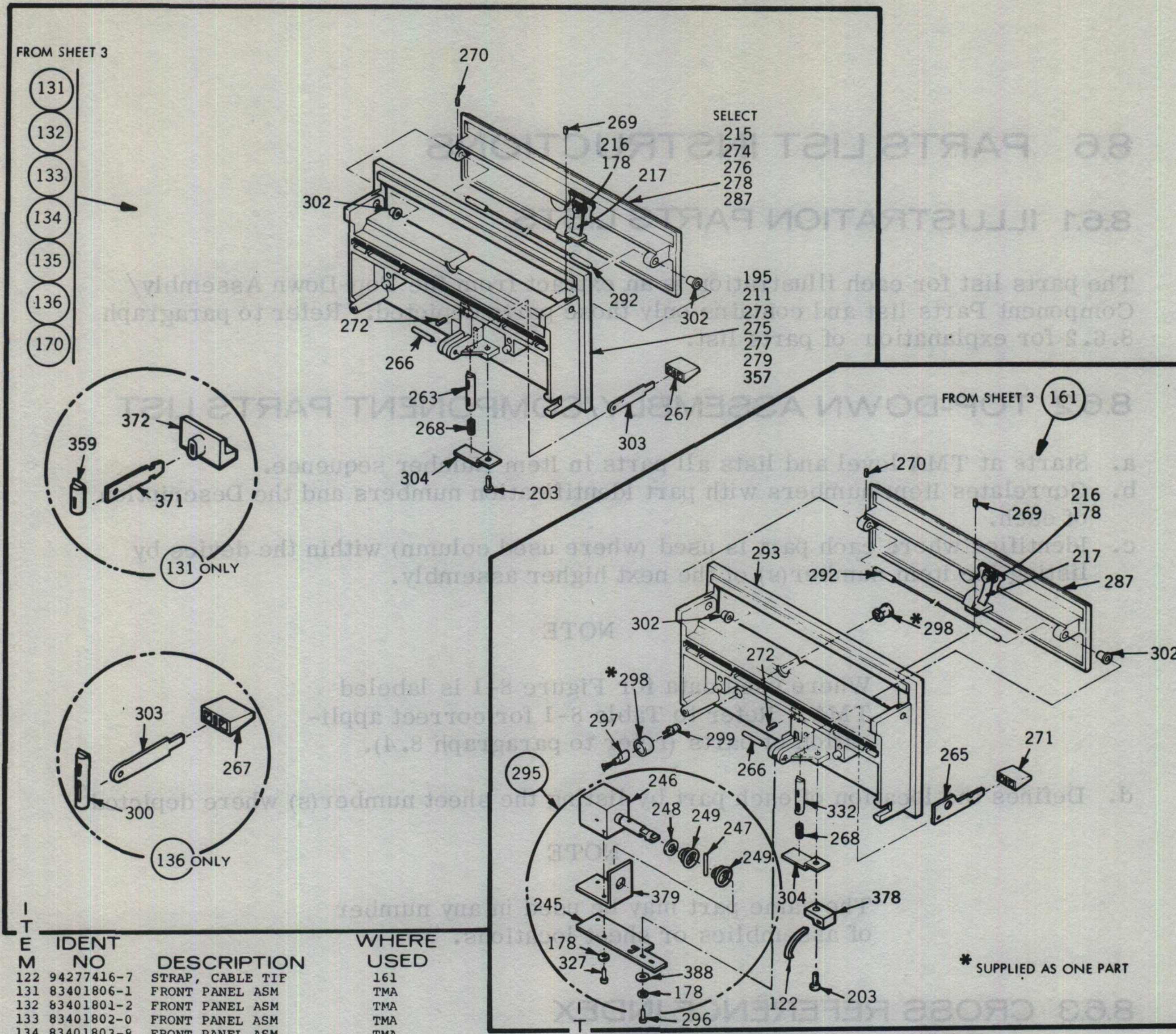
ITEM	IDENT NO	DESCRIPTION	WHERE USED
220	77833503-4	MOTOR PULLEY ASSY	111
221	77833504-2	MOTOR PULLEY ASSY	103
222	77833519-0	MOTOR PULLEY ASSY	107
223	77833520-8	MOTOR PULLEY ASSY	105
224	77833507-5	MOTOR PULLEY ASSY	106
225	77833535-6	MOTOR PULLEY ASSY	109
226	77833502-6	MOTOR PULLEY ASSY	102
227	77833501-8	MOTOR PULLEY ASSY	124
228	77833506-7	MOTOR PULLEY ASSY	104
229	77833527-3	MOTOR PULLEY ASSY	108
230	77833525-7	MOTOR PULLEY ASSY	109
231	75790000-6	CAUTION LABEL	124 139
231	75790000-6	CAUTION LABEL	102-107
231	75790000-6	CAUTION LABEL	111 112
231	75790000-6	CAUTION LABEL	113
233	77833532-3	MOTOR PULLEY ASSY	108
234	83435402-9	CONNECTOR	102-110
234	83435402-9	CONNECTOR	113 114
234	83435402-9	CONNECTOR	111 112
234	83435402-9	CONNECTOR	128 139
236	83435501-8	CONTACT PIN	102-128
238	51797233-7	TERMINAL	102-128
238	51797233-7	TERMINAL	114 139
239	62121108-5	TERMINAL	108-110
239	62121108-5	TERMINAL	114 128
240	15003254-8	WIRE (YELLOW)	102-128
240	15003254-8	WIRE (YELLOW)	129 130
240	15003254-8	WIRE (YELLOW)	114 139
241	15003309-0	WIRE	108-110
241	15003309-0	WIRE	114 128
242	75738478-9	CAPACITOR	110 114
243	75738421-9	CAPACITOR	109
243	75738421-9	CAPACITOR	114 128
243	75738421-9	CAPACITOR	108
244	75772500-7	CAPACITOR BOOT	108-110
244	75772500-7	CAPACITOR BOOT	114 128
305	77833526-5	MOTOR PULLEY ASSY	110
319	77833505-9	MOTOR PULLEY ASSY	113
337	93464000-4	WIRE BLACK	114 128
338	83435511-7	CONTACT PIN	102-128
338	83435511-7	CONTACT PIN	139
343	77833531-5	MOTOR PULLEY ASSY	110
344	75724543-6	CONNECTOR PANEL MTG	124
345	75724586-5	CONNECTOR PANEL MTG	124
347	93464555-7	WIRE 16 GRN	124
349	51797214-7	LUG TERM RING CRIMP	129 130
350	75724569-1	CONNECTOR PANEL MTG	129 130
351	75724585-7	CONNECTOR PANEL MTG	129 130
352	77833542-2	MOTOR PULLEY ASSY	139
356	77833545-5	MOTOR PULLEY ASSY	139
380	77833526-5	MOTOR PULLEY ASSY	128
381	77833531-5	MOTOR PULLEY ASSY	128
382	77833525-7	MOTOR PULLEY ASSY	129
383	77833535-6	MOTOR PULLEY ASSY	129
384	77833527-3	MOTOR PULLEY ASSY	130
385	77833532-3	MOTOR PULLEY ASSY	130
390	77833529-9	MOTOR PULLEY ASSY	114
391	77833534-9	MOTOR PULLEY ASSY	114

Figure 8-4. Drive Motor Assembly



ITEM	IDENT NO	DESCRIPTION	WHERE USED
125	83427801-2	WRITE PROTECT ASM	TMA
127	77830690-2	DISKETTE DETECT ASM	TMA
147	77594901-9	TRACK SWITCH ASM	TMA
156	77830641-5	AC CONN & RELAY ASM	TMA
168	77594704-7	OPT TRACK SENSE ASSY	TMA
186	10125803-6	WASHERS SPR LOCK	156
213	24548313-6	WIRE ELEC	127
214	24548311-0	WIRE ELEC	127
237	93541002-7	TERMINAL	127
251	77832458-2	OPTICAL SWITCH	125 127
252	75293954-6	CONNECTOR	125
252	75293954-6	CONNECTOR	168
253	94245602-1	CONTACT	125 127
253	94245602-1	CONTACT	168
254	93592082-7	SCREW HEX SELF TAP	168
258	93592164-3	SCR HX SELF TAP	125
258	93592164-3	SCR HX SFLF TAP	127
259	77835305-2	LABEL	168
260	75791600-2	MOUNT	147
261	75724402-5	SWITCH	147
262	75293956-1	CONNECTOR	127
264	77594403-6	MOUNT	168
307	77830550-8	SOLID STATE RELAY	156
308	10127334-0	SCREW	156
309	10125105-6	NUT	156
354	09000004-3	SCREW BIND HEAD	147
355	75885407-9	OPTICAL SWITCH	168
374	94277400-1	TIE STRAP	125 127
386	10125102-3	SCR NUT HEX	168
387	10126100-6	WASH INT TOOTH LK	168

Figure 8-5. Miscellaneous Sub-Assemblies



ITEM	IDENT NO	DESCRIPTION	WHERE USED
122	94277416-7	STRAP, CABLE TIF	161
131	83401806-1	FRONT PANEL ASM	TMA
132	83401801-2	FRONT PANEL ASM	TMA
133	83401802-0	FRONT PANEL ASM	TMA
134	83401803-8	FRONT PANEL ASM	TMA
135	83401804-6	FRONT PANEL ASM	TMA
136	83401805-3	FRONT PANEL ASM	TMA
161	77834543-9	FRONT PANEL ASSY	TMA
170	83401808-7	FRONT PANEL ASSY	TMA
178	10125801-0	WASHERS SPR LOCK	161
178	10125801-0	WASHERS SPR LOCK	131-136
195	83426624-9	PANEL FRONT FIN BLK	132
203	93592162-7	SCR HX WASHER SLF TA	131-136
203	93592162-7	SCR HX WASHER SLF TA	161
211	83426626-4	PANEL FRONT FIN BLU	170
215	75812126-3	DOOR FINISHED BLU	170
216	93592080-1	SCR HEX WSR HD	131-136
216	93592080-1	SCR HEX WSR HD	161
217	75884657-0	LEAF SPRING	131-136
217	75884657-0	LEAF SPRING	161
245	77835131-2	SOLENOID BRKT	295
246	77834212-1	SOLENOID	295
247	93530103-6	PIN ROLL	295
248	75806507-2	WASHER	295
249	77834323-6	SPRING	295
263	83402301-2	LATCH-DOOR INJEC MOL	131-136
265	77834318-6	LEVER-DOOR	161
266	92096099-4	PIN-GROOVED	131-136
266	92096099-4	PIN-GROOVED	161
267	75292700-4	KNOB-LEVER	132-136
268	83401200-7	SPRING-LATCH	131-136
268	83401200-7	SPRING-LATCH	161
269	83413406-6	SCR SET SOC HD 6-32	131-136
269	83413406-6	SCR SET SOC HD 6-32	161
270	83413407-4	SCREW SET SOC HD 4-4	131-136
270	83413407-4	SCREW SET SOC HD 4-4	161
271	75292701-2	KNOB-LEVER	161
272	83413404-1	SCREW-SELF LOCKING	131-136
272	83413404-1	SCREW-SELF LOCKING	161
273	83426621-5	PANEL FRONT, BLACK HW	133
274	75812121-4	DOOR, FINISHED, PA-BLK	133
275	83426622-3	PANEL FRONT, WHITE HW	134
276	75812122-2	DOOR, FINISHED, PA-WHT	134
277	83426623-1	PANEL FRONT, FIN BLUE	135
278	75812123-0	DOOR, FINISHED, PA-BLU	135
279	83461110-5	FRONT PANEL FINISHED	136
287	75812124-8	DOOR FINISHED BLACK	132 136
287	75812124-8	DOOR FINISHED BLACK	161
287	75812124-8	DOOR FINISHED BLACK	131
292	83403202-1	BAR TORSION DOOR	131-136
292	83403202-1	BAR TORSION DOOR	161
293	83461111-3	FRONT PANEL	161
295	77835133-8	DOOR LK ASSY	161
296	91976207-0	SCREW	161
297	77833702-2	HARNESS DR LK	161
298	75810703-1	DIODE LIGHT	161
299	75810701-5	DIODE LIGHT	161
300	83461200-4	LATCH DOOR	136
302	83401500-0	BUSHING-DOOR INJECT	131-136
302	83401500-0	BUSHING-DOOR INJECT	161
303	75746000-1	LEVER-DOOR	136
304	75746800-4	BRACKET LATCH	131-136
304	75746800-4	BRACKET LATCH	161
327	10127321-7	SCR PAN HD	295
332	83461200-4	LATCH DOOR	161
357	77832410-3	PANEL FRONT BLK-BURR	131
359	77830977-3	LATCH DOOR	131
371	77832695-9	LEVER DOOR	131
372	77832119-0	BUTTON LATCH	131
378	95862300-1	ANCHOR CABLE TIE	161
379	77835132-0	SPACER BKT	295

Figure 8-6. Front Panel Assembly

8.6 PARTS LIST INSTRUCTIONS

8.6.1 ILLUSTRATION PARTS LISTS

The parts list for each illustration is an extract from the Top-Down Assembly/ Component Parts list and contains only those parts depicted. Refer to paragraph 8.6.2 for explanation of parts list.

8.6.2 TOP-DOWN ASSEMBLY/COMPONENT PARTS LIST

a. Starts at TMA level and lists all parts in Item Number sequence.
b. Correlates Item numbers with part Identification numbers and the Description of each.
c. Identifies where each part is used (where used column) within the device by listing the item number(s) of the next higher assembly.

NOTE

Where used data for Figure 8-1 is labeled TMA. Refer to Table 8-1 for correct application of parts (refer to paragraph 8.4).

d. Defines the location of each part by listing the sheet number(s) where depicted.

NOTE

The same part may be used in any number of assemblies or sheet locations.

8.6.3 CROSS REFERENCE INDEX

a. Lists all parts in numeric sequence (by Identification Number).
b. In conjunction with the referenced sheet number (third column) and illustrations defines the physical location of each item identified.

8.6.4 SHEET NUMBER REFERENCING

Sheet number references on Parts Lists and Illustrations refers to sheet locations in this section. Example: Sheet reference 3 represents sheet 8-3, sheet 4 represents sheet 8-4, etc.

Top-Down Assembly/Component Parts List

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA	3
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA	4
101	83458201-7	CHASSIS ASM-COMMON PARTS	TMA	5
102	75291920-9	DRIVE MOTOR ASM	TMA	3
102	75291920-9	DRIVE MOTOR ASM	TMA	7
103	75291923-3	DRIVE MOTOR ASM	TMA	3
103	75291923-3	DRIVE MOTOR ASM	TMA	7
104	75291926-6	DRIVE MOTOR ASM	TMA	3
104	75291926-6	DRIVE MOTOR ASM	TMA	7
105	75291927-4	DRIVE MOTOR ASM	TMA	3
105	75291927-4	DRIVE MOTOR ASM	TMA	7
106	75291928-2	DRIVE MOTOR ASM	TMA	3
106	75291928-2	DRIVE MOTOR ASM	TMA	7
107	75291925-8	DRIVE MOTOR ASM	TMA	3
107	75291925-8	DRIVE MOTOR ASM	TMA	7
108	75747904-3	DRIVE MOTOR ASM	TMA	3
108	75747904-3	DRIVE MOTOR ASM	TMA	7
109	75747903-5	DRIVE MOTOR ASM	TMA	3
109	75747903-5	DRIVE MOTOR ASM	TMA	7
110	75747905-0	DRIVE MOTOR ASM	TMA	3
110	75747905-0	DRIVE MOTOR ASM	TMA	7
111	75291921-7	DRIVE MOTOR ASM	TMA	3
111	75291921-7	DRIVE MOTOR ASM	TMA	7
113	75291924-1	DRIVE MOTOR ASM	TMA	3
113	75291924-1	DRIVE MOTOR ASM	TMA	7
114	75747909-2	DRIVE MOTOR ASSY	TMA	7
114	75747909-2	DRIVE MOTOR ASSY	TMA	3
122	94277416-7	STRAP, CABLE TIE	TMA	3
122	94277416-7	STRAP, CABLE TIE	161	9
124	75291902-7	DRIVE MOTOR ASM	TMA	3
124	75291902-7	DRIVE MOTOR ASM	TMA	7
125	83427801-2	WRITE PROTECT ASM	TMA	3
125	83427801-2	WRITE PROTECT ASM	TMA	8
126	92602001-7	CLAMP	TMA	3
127	77830690-2	DISKETTE DETECT ASM	TMA	3
127	77830690-2	DISKETTE DETECT ASM	TMA	8
128	77830680-3	DRIVE MOTOR ASM	TMA	3
128	77830680-3	DRIVE MOTOR ASM	TMA	7
129	77834213-9	DRIVE MOTOR ASM	TMA	3
129	77834213-9	DRIVE MOTOR ASM	TMA	7
130	77834214-7	DRIVE MOTOR ASM	TMA	3
130	77834214-7	DRIVE MOTOR ASM	TMA	7
131	83401806-1	FRONT PANEL ASM	TMA	3
131	83401806-1	FRONT PANEL ASM	TMA	9
132	83401801-2	FRONT PANEL ASM	TMA	3
132	83401801-2	FRONT PANEL ASM	TMA	9
133	83401802-0	FRONT PANEL ASM	TMA	3
133	83401802-0	FRONT PANEL ASM	TMA	9
134	83401803-8	FRONT PANEL ASM	TMA	3
134	83401803-8	FRONT PANEL ASM	TMA	9
135	83401804-6	FRONT PANEL ASM	TMA	3
135	83401804-6	FRONT PANEL ASM	TMA	9
136	83401805-3	FRONT PANEL ASM	TMA	3
136	83401805-3	FRONT PANEL ASM	TMA	9
137	75791506-1	ACTUATOR ASM	TMA	3
137	75791506-1	ACTUATOR ASM	TMA	6
138	75791507-9	ACTUATOR ASM	TMA	3
138	75791507-9	ACTUATOR ASM	TMA	6
139	75747917-5	DRIVE MOTOR ASM	TMA	3
139	75747917-5	DRIVE MOTOR ASM	TMA	7
140	77830685-2	UPPER HARNESS ASM	TMA	3
141	75747301-2	UPPER HARNESS ASM	TMA	3
142	83403502-4	LOWER HARNES ASM	TMA	3
143	83403503-2	LOWER HARNESS ASM	TMA	3
144	83403700-4	CONNECTOR BRACKET	TMA	3
145	75272300-7	CONNECTOR BRACKET	TMA	3
146	77830538-3	CSA LABEL	TMA	3
147	77594901-9	TRACK SWITCH ASM	TMA	3
147	77594901-9	TRACK SWITCH ASM	TMA	8
148	83460101-5	AMP CONN KIT	TMA	3
149	75746702-4	CAPACITOR BRACKET	TMA	3
150	72959302-0	LABEL	TMA	3
152	77832691-8	MOUNTING KIT	TMA	3
152	77832691-8	MOUNTING KIT	TMA	4
155	93592240-1	SCREW-WASHER	TMA	3
156	77830641-5	AC CONN & RELAY ASM	TMA	3
156	77830641-5	AC CONN & RELAY ASM	TMA	6
157	77830995-5	COVER	TMA	3
158	17901508-6	SCREW	TMA	3
160	77834336-8	LABEL, FCO	TMA	3
161	77834543-9	FRONT PANEL ASSY	TMA	3
161	77834543-9	FRONT PANEL ASSY	TMA	9
162	75746701-4	CAPACITOR BRACKET	TMA	3
164	77836055-2	LABEL	TMA	3
165	75791508-7	ACTUATOR ASSY	TMA	3
165	75791508-7	ACTUATOR ASSY	TMA	6
168	77594704-7	OPT TRACK SFNSE ASSY	TMA	8
168	77594704-7	OPT TRACK SENSE ASSY	TMA	3
170	83401808-7	FRONT PANEL ASSY	TMA	3
170	83401808-7	FRONT PANEL ASSY	TMA	9
171	83402101-6	CONE ASM	101	5
172	75273200-8	BUSHING	101	5
173	75747202-2	SOLENOID	101	5
174	77834331-9	EXTENSION ARMATURE	101	5
175	77834326-9	BAIL ARMATURE	101	5
176	75885163-8	PUSH ROD ASSY	101	5
178	10125801-0	WASHERS SPR LOCK	101	4
178	10125801-0	WASHERS SPR LOCK	101	5
178	10125801-0	WASHERS SPR LOCK	161	9
178	10125801-0	WASHERS SPR LOCK	131-136	9
179	77830732-2	FOAM PAD	101	5
180	75293203-8	BELT-FLAT	101	4

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
181	75292609-7	SPRING-COMPRESSION	101	5
182	75292611-3	SPRING-COMPRESSION	101	5
183	75774732-4	CLIP-PUSH IN	101	4
184	75774736-5	CLIP-PUSH IN	101	4
186	10125803-6	WASHERS SPR LOCK	101	4
186	10125803-6	WASHERS SPR LOCK	156	8
186	10125803-6	WASHERS SPR LOCK	101	5
187	77832145-5	IDENT RATING UP	101	4
188	77832145-5	LABEL IDENT	101	4
189	77835200-5	WASHER, NYLON	101	5
190	94217702-3	NUT-SELF LOCK, STL 8	101	4
191	92073022-3	BEARING FLANGED	101	4
191	92073022-3	BEARING FLANGED	171	5
192	93529005-6	WASHER-SPRING WAVE	101	4
193	92033037-0	RING RETAINING	101	5
194	92033038-8	RETAINING RING	101 171	5
195	83426624-9	PANEL FRONT FIN BLK	132	9
196	16402506-6	CLAMP CABLE	101	4
197	09000005-0	SCREW BIND HEAD	101	5
198	09000202-3	SCREW BIND HEAD	101	5
199	09000403-7	SCREW BIND HEAD	101	4
200	09000504-2	SCREW BIND HEAD	101	5
201	10126219-4	SCR HEX SOC HD CAP	101	5
202	10126222-8	SCREW HEX SOC HD	101	4
203	93592162-7	SCR HX WASHER SLF TA	131-136	9
203	93592162-7	SCR HX WASHER SLF TA	161	9
204	77832438-4	NUT, SELFTHD	101	4
205	93592086-8	SCR HEX SELF TAP	101	4
205	93592086-8	SCR HEX SELF TAP	101	5
206	83413408-2	SCREW-SELF LOCKING	101	5
207	83411202-1	BUMPER DOOR	101	5
208	92602003-3	CLAMP, CABLE-NYLON	101	4
209	10126214-5	SCR HEX SOC HD CAP	101	4
210	83427900-2	PLATE-NUT	101	4
211	83426626-4	PANEL FRONT FIN BLU	170	9
212	75806503-1	FLAT WASHER	101	5
213	24548313-6	WIRE ELEC	127	8
214	24548311-0	WIRE ELEC	127	8
215	75812126-3	DOOR FINISHED BLU	170	9
216	93592080-1	SCR HEX WSR HD	131-136	9
216	93592080-1	SCR HEX WSR HD	161	9
217	75884657-0	LEAF SPRING	131-136	9
217	75884657-0	LEAF SPRING	161	9
220	77833503-4	MOTOR PULLEY ASSY	111	7
221	77833504-2	MOTOR PULLEY ASSY	103	7
222	77833519-0	MOTOR PULLEY ASSY	107	7
223	77833520-8	MOTOR PULLEY ASSY	105	7
224	77833507-5	MOTOR PULLEY ASSY	106	7
225	77833535-6	MOTOR PULLEY ASSY	109	7
226	77833502-6	MOTOR PULLEY ASSY	102	7
227	77833501-8	MOTOR PULLEY ASSY	124	7
228	77833506-7	MOTOR PULLEY ASSY	104	7
229	77833527-3	MOTOR PULLEY ASSY	108	7
230	77833525-7	MOTOR PULLEY ASSY	109	7
231	75790000-6	CAUTION LABEL	137 138	6
231	75790000-6	CAUTION LABEL	124 139	7
231	75790000-6	CAUTION LABEL	102-107	7
231	75790000-6	CAUTION LABEL	111 112	7
231	75790000-6	CAUTION LABEL	113	7
231	75790000-6	CAUTION LABEL	165	6
233	77833532-3	MOTOR PULLEY ASSY	108	7
234	83435402-9	CONNECTOR	102-110	7
234	83435402-9	CONNECTOR	113 114	7
234	83435402-9	CONNECTOR	111 112	7
234	83435402-9	CONNECTOR	128 139	7
235	77830308-1	LEAF ACTUATOR	101	5
236	83435501-8	CONTACT PIN	102-128	7
237	93541002-7	TERMINAL	127	8
238	51797233-7	TERMINAL	102-128	7
238	51797233-7	TERMINAL	114 139	7
239	62121108-5	TERMINAL	108-110	7
239	62121108-5	TERMINAL	114 128	7
240	15003254-8	WIRE (YELLOW)	102-128	7
240	15003254-8	WIRE (YELLOW)	129 130	7
240	15003254-8	WIRE (YELLOW)	114 139	7
241	15003309-0	WIRE	108-110	7
241	15003309-0	WIRE	114 128	7
242	75738478-9	CAPACITOR	110 114	7
243	75738421-9	CAPACITOR	109	7
243	75738421-9	CAPACITOR	114 128	7
243	75738421-9	CAPACITOR	108	7
244	75772500-7	CAPACITOR BOOT	108-110	7
244	75772500-7	CAPACITOR BOOT	114 128	7
245	77835131-2	SOLENOID BRKT	295	9
246	77834212-1	SOLENOID	295	9
247	93530103-6	PIN ROLL	295	9
248	75806507-2	WASHER	295	9
249	77834323-6	SPRING	295	9
250	93592482-9	SCR HEX HD	101	5
251	77832458-2	OPTICAL SWITCH	125 127	8
252	75293954-6	CONNECTOR	125	8
252	75293954-6	CONNECTOR	168	8
253	94245602-1	CONTACT	125 127	8
253	94245602-1	CONTACT	168	8
254	93592082-7	SCREW HEX SELF TAP	168	8
255	10127131-0	SCREW	152	4
256	10125805-1	LOCK WASHER	152	4
258	93592164-3	SCR HX SELF TAP	125	8
258	93592164-3	SCR HX SELF TAP	127	8
259	77835305-2	LABEL	168	8
260	75791600-2	MOUNT	147	6
261	75724402-5	SWITCH	147	8

Top-Down Assembly/Component Parts (continued)

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
262	75293956-1	CONNECTOR	127	8
263	83402301-2	LATCH-DOOR INJEC MOL	131-136	9
264	77594403-6	MOUNT	168	8
265	77834318-6	LEVER-DOOR	161	9
266	92096099-4	PIN-GROOVED	131-136	9
266	92096099-4	PIN-GROOVED	161	9
267	75292700-4	KNOB-LEVER	132-136	9
268	83401200-7	SPRING-LATCH	131-136	9
268	83401200-7	SPRING-LATCH	161	9
269	83413406-6	SCR SET SOC HD 6-32	131-136	9
269	83413406-6	SCR SET SOC HD 6-32	161	9
270	83413407-4	SCREW SET SOC HD 4-4	131-136	9
270	83413407-4	SCREW SET SOC HD 4-4	161	9
271	75292701-2	KNOB-LEVER	161	9
272	83413404-1	SCREW-SELF LOCKING	131-136	9
272	83413404-1	SCREW-SELF LOCKING	161	9
273	83426621-5	PANEL FRONT, BLACK HW	133	9
274	75812121-4	DOOR, FINISHED, PA-BLK	133	9
275	83426622-3	PANEL FRONT, WHITE HW	134	9
276	75812122-2	DOOR, FINISHED, PA-WHT	134	9
277	83426623-1	PANEL FRONT, FIN BLUE	135	9
278	75812123-0	DOOR, FINISHED, PA-BLU	135	9
279	83461110-5	FRONT PANEL FINISHED	136	9
280	75747801-1	STEPPER MOTOR ASM	137 138	6
280	75747801-1	STEPPER MOTOR ASM	165	6
281	77830484-0	CARRIAGE ASM	137	6
282	77830485-7	CARRIAGE ASM	138	6
284	77594000-0	SPRING-CARRIAGE	137 138	6
284	77594000-0	SPRING-CARRIAGE	165	6
285	77603501-6	STOP-CARRIAGE DIE CA	137 138	6
285	77603501-6	STOP-CARRIAGE DIE CA	165	6
286	10126209-5	SCR-SOC HP CAP	137 138	6
286	10126209-5	SCR-SOC HP CAP	281 282	6
286	10126209-5	SCR-SOC HP CAP	165	6
287	75812124-8	DOOR FINISHED BLACK	132 136	9
287	75812124-8	DOOR FINISHED BLACK	161	9
287	75812124-8	DOOR FINISHED BLACK	131	9
288	75813000-9	RETAINER-BEARING	137 138	6
288	75813000-9	RETAINER-BEARING	165	6
289	92073020-7	BEARING FLANGED	137 138	6
289	92073020-7	BEARING FLANGED	165	6
290	94217207-3	BRG BALL-EXT INNER R	137 138	6
290	94217207-3	BRG BALL-EXT INNER R	165	6
291	77832395-6	WASHER-SPRING WAVE	137 138	6
291	77832395-6	WASHER-SPRING WAVE	165	6
292	83403202-1	BAR TORSION DOOR	131-136	9
292	83403202-1	BAR TORSION DOOR	161	9
293	83461111-3	FRONT PANEL	161	9
294	77832456-6	LUBRICANT	137 138	6
294	77832456-6	LUBRICANT	165	6
295	77835133-8	DOOR LK ASSY	161	9
296	91976207-0	SCREW	161	9
297	77833702-2	HARNESS DR LK	161	9
298	75810703-1	DIODE LIGHT	161	9
299	75810701-5	DIODE LIGHT	161	9
300	83461200-4	LATCH DOOR	136	9
301	77830975-7	ADAPTER	152	4
302	83401500-0	BUSHING-DOOR INJECT	131-136	9
302	83401500-0	BUSHING-DOOR INJECT	161	9
303	75746000-1	LEVER-DOOR	136	9
304	75746800-4	BRACKET LATCH	131-136	9
304	75746800-4	BRACKET LATCH	161	9
305	77833526-5	MOTOR PULLEY ASSY	110	7
307	77830550-8	SOLID STATE RELAY	156	8
308	10127334-0	SCREW	156	8
309	10125105-6	NUT	156	8
310	75790800-9	SHAFT	171	5
311	83426400-4	EXPANDER-CONE	171	5
312	77830481-6	CONE-DISK LOAD	171	5
313	83402200-6	SPRING CONE	171	5
314	92033029-7	RETAINING RING	171	5
315	83409701-6	SPRING-GARTER	171	5
316	94047069-3	WASHER	171	5
317	77835201-3	WASHER	171	5
318	77839900-6	CARRIAGE ASSY	165	6
319	77833505-9	MOTOR PULLEY ASSY	113	7
320	75812011-7	SUPPORT DIE CAST MACHINED	368	5
321	75292807-7	BEARING-CYLINDRICAL	368	5
322	75813201-3	BUSHING, PUSH ROD MOLDED	368	5
323	75813202-1	BUSHING, PUSH ROD MOLDED	368	5
324	83426202-4	CARRIAGE HEAD ASSY	281 282	6
325	77603100-7	ARM-HEAD LOAD	281 282	6
326	77830482-4	HOLDER-PAD ASSY	281 282	6
327	10127321-7	SCR PAN HD	295	9
328	77595600-6	TAB-OPTICAL ACTUATE	282	6
329	77830998-9	PIN CARRIAGE	281 282	6
330	77830999-7	SPRING TORSION	281 282	6
331	94047068-5	WASHER, SPECIAL	282	6
332	83461200-4	LATCH DOOR	161	9
333	10127310-0	SCREW SLOTTED	281 282	6
334	10125001-7	SCREW HEX HD	137 138	6
334	10125001-7	SCREW HEX HD	165	6
335	94047000-8	WASHER	137 138	6
335	94047000-8	WASHER	165	6
336	93592160-1	SCREW, SELF TAP	101	4
336	93592160-1	SCREW, SELF TAP	TMA	3
337	93464000-4	WIRE BLACK	114 128	7
338	83435511-7	CONTACT PIN	102-128	7
338	83435511-7	CONTACT PIN	139	7
339	10126401-8	STAR LOCK WASHER	101	4
340	75731302-8	ELECTRICAL SYMBOL	101	4
341	83465601-9	ADHESIVE	282	6

ITEM	IDENT NO	DESCRIPTION	WHERE USED	SH
342	77594800-3	DECAL	152	4
343	77833531-5	MOTOR PULLEY ASSY	110	7
344	75724543-6	CONNECTOR PANEL MTG	124	7
345	75724586-5	CONNECTOR PANEL MTG	124	7
347	93464555-7	WIRE 16 GRN	124	7
349	51797214-7	LUG TERM RING CRIMP	129 130	7
350	75724569-1	CONNECTOR PANEL MTG	129 130	7
351	75724585-7	CONNECTOR PANEL MTG	129 130	7
352	77833542-2	MOTOR PULLEY ASSY	139	7
353	77830308-1	ACTUATOR SWITCH	101	5
354	09000004-3	SCREW BIND HEAD	147	8
355	75885407-9	OPTICAL SWITCH	168	8
356	77833545-5	MOTOR PULLEY ASSY	139	7
357	77832410-3	PANEL FRONT BLK-BURR	131	9
358	83426203-2	CARRIAGE HEAD ASSY	318	6
359	77830977-3	LATCH DOOR	131	9
360	75791700-0	BASE-MECHANISM, DIE	101	4
361	83403601-4	SPINDLE	101	4
362	75747000-0	SPACER BEARING	101	4
363	75745200-8	PULLEY-SPINDLE	101	4
365	83461800-1	CLAMP, STEPPER MOTOR	101	4
366	75292400-1	GUIDE-CARRIAGE	101	4
367	83401700-6	RAIL-DISK INJEC MOLD	101	4
368	75812021-6	SUPPORT-ASSEMBLED	101	5
369	83402800-3	ARM-DISK LOAD	101	5
370	75273000-2	PIN DISK LOAD ARM	101	5
371	77832695-9	LEVER DOOR	131	9
372	77832119-0	BUTTON LATCH	131	9
373	77835304-5	LABEL	324 358	6
374	94277400-1	TIE STRAP	125 127	8
375	83427303-9	NUT CARRIAGE	165	6
377	93592486-0	SCREW	101	4
378	95862300-1	ANCHOR CABLE TIE	161	9
379	77835132-0	SPACER BKT	295	9
380	77833526-5	MOTOR PULLEY ASSY	128	7
381	77833531-5	MOTOR PULLEY ASSY	128	7
382	77833525-7	MOTOR PULLEY ASSY	129	7
383	77833535-6	MOTOR PULLEY ASSY	129	7
384	77833527-3	MOTOR PULLEY ASSY	130	7
385	77833532-3	MOTOR PULLEY ASSY	130	7
386	10125102-3	SCR NUT HEX	168	8
387	10126100-6	WASH INT TOOTH LK	168	8
388	10125603-0	WASHER	101	4
388	10125603-0	WASHER	101	5
390	77833529-9	MOTOR PULLEY ASSY	114	7
391	77833534-9	MOTOR PULLEY ASSY	114	7

Cross Reference Index

ITEM	IDENT NO	SH
354	09000004-3	8
197	09000005-0	5
198	09000202-3	5
199	09000403-7	4
200	09000504-2	5
334	10125001-7	6
334	10125001-7	6
386	10125102-3	8
309	10125105-6	8
388	10125603-0	4
388	10125603-0	5
178	10125801-0	4
178	10125801-0	5
178	10125801-0	9
178	10125801-0	9
186	10125803-6	4
186	10125803-6	8
186	10125803-6	5
256	10125805-1	4
387	10126100-6	8
286	10126209-5	6
286	10126209-5	6
286	10126209-5	6
209	10126214-5	4
201	10126219-4	5
202	10126222-8	4
339	10126401-8	4
255	10127131-0	4
333	10127310-0	6
327	10127321-7	9
308	10127334-0	8
240	15003254-8	7
240	15003254-8	7
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241	15003309-0	7
241	15003309-0	7
196	16402506-6	4
158	17901508-6	3
214	24548311-0	8
213	24548313-6	8
349	51797214-7	7
238	51797233-7	7
238	51797233-7	7
239	62121108-5	7
239	62121108-5	7
150	72959302-0	3
145	75272300-7	3
370	75273000-2	5
172	75273200-8	5
124	75291902-7	3
124	75291902-7	7
102	75291920-9	3
102	75291920-9	7
111	75291921-7	3
111	75291921-7	7
103	75291923-3	3
103	75291923-3	7
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113	75291924-1	7
107	75291925-8	3
107	75291925-8	7
104	75291926-6	3
104	75291926-6	7
105	75291927-4	3
105	75291927-4	7
106	75291928-2	3
106	75291928-2	7
366	75292400-1	4
181	75292609-7	5
182	75292611-3	5
267	75292700-4	9
271	75292701-2	9
321	75292807-7	5
180	75293203-8	4
252	75293954-6	8
252	75293954-6	8
262	75293956-1	8
261	75724402-5	8
344	75724543-6	7
350	75724569-1	7
351	75724585-7	7
345	75724586-5	7
340	75731302-8	4
243	75738421-9	7
243	75738421-9	7
243	75738421-9	7
242	75738478-9	7
363	75745200-8	4
303	75746000-1	9
162	75746701-4	3
149	75746702-4	3
304	75746800-4	9
304	75746800-4	9
362	75747000-0	4
173	75747202-2	5
141	75747301-2	3
280	75747801-1	6
280	75747801-1	6

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109	75747903-5	3
109	75747903-5	7
108	75747904-3	3
108	75747904-3	7
110	75747905-0	3
110	75747905-0	7
114	75747909-2	7
114	75747909-2	3
139	75747917-5	3
139	75747917-5	7
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244	75772500-7	7
183	75774732-4	4
184	75774736-5	4
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231	75790000-6	7
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310	75790800-9	5
137	75791506-1	3
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138	75791507-9	3
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165	75791508-7	3
165	75791508-7	6
260	75791600-2	8
360	75791700-0	4
212	75806503-1	5
248	75806507-2	9
299	75810701-5	9
298	75810703-1	9
320	75812011-7	5
368	75812021-6	5
274	75812121-4	9
276	75812122-2	9
278	75812123-0	9
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287	75812124-8	9
215	75812126-3	9
288	75813000-9	6
288	75813000-9	6
322	75813201-3	5
323	75813202-1	5
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217	75884657-0	9
176	75885163-8	5
355	75885407-9	8
284	77594000-0	6
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264	77594403-6	8
168	77594704-7	8
168	77594704-7	3
342	77594800-3	4
147	77594901-9	3
147	77594901-9	8
328	77595600-6	6
325	77603100-7	6
285	77603501-6	6
285	77603501-6	6
235	77830308-1	5
353	77830308-1	5
312	77830481-6	5
326	77830482-4	6
281	77830484-0	6
282	77830485-7	6
146	77830538-3	3
307	77830550-8	8
156	77830641-5	3
156	77830641-5	8
128	77830680-3	3
128	77830680-3	7
140	77830685-2	3
127	77830690-2	3
127	77830690-2	8
179	77830732-2	5
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157	77830995-5	3
329	77830998-9	6
330	77830999-7	6
372	77832119-0	9
187	77832145-5	4
188	77832145-5	4
291	77832395-6	6
291	77832395-6	6
357	77832410-3	9
204	77832438-4	4
294	77832456-6	6
294	77832456-6	6
251	77832458-2	8
152	77832691-8	3
152	77832691-8	4
371	77832695-9	9
227	77833501-8	7
226	77833502-6	7

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220	77833503-4	7
221	77833504-2	7
319	77833505-9	7
228	77833506-7	7
224	77833507-5	7
222	77833519-0	7
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382	77833525-7	7
305	77833526-5	7
380	77833526-5	7
229	77833527-3	7
384	77833527-3	7
390	77833529-9	7
343	77833531-5	7
381	77833531-5	7
233	77833532-3	7
385	77833532-3	7
391	77833534-9	7
225	77833535-6	7
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130	77834214-7	7
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249	77834323-6	9
175	77834326-9	5
174	77834331-9	5
160	77834336-8	3
161	77834543-9	3
161	77834543-9	9
245	77835131-2	9
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295	77835133-8	9
189	77835200-5	5
317	77835201-3	5
373	77835304-5	6
259	77835305-2	8
164	77836055-2	3
318	77839900-6	6
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268	83401200-7	9
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171	83402101-6	5
313	83402200-6	5
263	83402301-2	9
369	83402800-3	5
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292	83403202-1	9
142	83403502-4	3
143	83403503-2	3
361	83403601-4	4
144	83403700-4	3
315	83409701-6	5
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272	83413404-1	9
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269	83413406-6	9
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270	83413407-4	9
206	83413408-2	5
324	83426202-4	6
358	83426203-2	6
311	83426400-4	5
273	83426621-5	9
275	83426622-3	9
277	83426623-1	9
195	83426624-9	9
211	83426626-4	9
375	83427303-9	6
125	83427801-2	3
125	83427801-2	8
210	83427900-2	4
234	83435402-9	7
234	83435402-9	7
234	83435402-9	7

ITEM	IDENT NO	SH
234	83435402-9	7
236	83435501-8	7
338	83435511-7	7
338	83435511-7	7
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148	83460101-5	3
279	83461110-5	9
293	83461111-3	9
300	83461200-4	9
332	83461200-4	9
365	83461800-1	4
341	83465601-9	6
296	91976207-0	9
314	92033029-7	5
193	92033037-0	5
194	92033038-8	5
289	92073020-7	6
289	92073020-7	6
191	92073022-3	4
191	92073022-3	5
266	92096099-4	9
266	92096099-4	9
126	92602001-7	3
208	92602003-3	4
337	93464000-4	7
347	93464555-7	7
192	93529005-6	4
247	93530103-6	9
237	93541002-7	8
216	93592080-1	9
216	93592080-1	9
254	93592082-7	8
205	93592086-8	4
205	93592086-8	5
336	93592160-1	4
336	93592160-1	3
203	93592162-7	9
203	93592162-7	9
258	93592164-3	8
258	93592164-3	8
155	93592240-1	3
250	93592482-9	5
377	93592486-0	4
335	94047000-8	6
335	94047000-8	6
331	94047068-5	6
316	94047069-3	5
290	94217207-3	6
290	94217207-3	6
190	94217702-3	4
253	94245602-1	8
253	94245602-1	8
374	94277400-1	8
122	94277416-7	3
122	94277416-7	9
378	95862300-1	9

IX
WIRE LISTS

9.1 INTRODUCTION

The following paragraphs contain the wire lists for the Upper Harness Assembly, Lower Harness Assembly and the Stepper Motor.

9.2 UPPER HARNESS ASSEMBLIES

Wire Color	Origin	Destination	Approximate Length Inches
Red	Solenoid-A	J5-5	11.0" (27.94cm)
Black	Solenoid-B	J5-2	11.0" (27.94cm)
Brown	Interlock Common	J5-6	13.5" (34.29cm)
White	Interlock N.O.	J5-4	13.5" (34.29cm)
Blue	Lamp-Emitter	J5-1	13.5" (34.29cm)
Yellow	Lamp-Collector	J5-3	13.5" (34.29cm)

9.3 LOWER HARNESS ASSEMBLY

Wire Color	Origin	Destination	Approximate Length Inches
Black	Track 0 Common	J3-5	20.0" (50.8cm)
Red	Track 0 N.C.	J3-3	20.0" (50.8cm)
White	Track 0 N.O.	J3-2	20.0" (50.8cm)
Blue	Photo Cell Emitter	J3-4	9.0" (22.86cm)
Yellow	Photo Cell Collector	J3-1	9.0" (22.86cm)

9.4 STEPPER MOTOR

Wire Color	Origin	Destination	Approximate Length Inches
Brown	Stepper Motor	J4-1	13.0" (33.02cm)
Red		J4-2	13.0" (33.02cm)
Oragne		J4-3	13.0" (33.02cm)
Black		J4-4	13.0" (33.02cm)

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